CREATING CAROUSEL HORSES

by Rebecca Hays

Designing, Pattern Making, Building, Carving, Painting

"Rose"

Copy write Hays 2026

Introduction

HUNTER

I began working on old carousel horses in 1969. This was the beginning of a 45-year career restoring antique figures for collectors, museums, and operating rides. I also had commissions for new animals. One is shown above and another is on page 235 in Painted Ponies by Bill Manns.

Back then there was no information available on making carousel figures. It took decades to reinvent lost techniques and come up with new ones. To keep what I learned from disappearing into the dust of time again I took notes and pictures over the years with the idea of someday compiling this book. The photos are therefore of several horses.

I welcome fellow carousel enthusiasts to free-download the material for personal use but no part of the text or images may be reproduced for commercial purposes.

Rebecca Hays

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CHAPTER 1

DESIGNING A FIGURE

Where to Start

You can begin with your own sketches, as I do, or use photos of antique horses. A Breyer horse is helpful for muscles but carousel animals are narrower and more slab-sided. Heads are proportionally larger and leg joints are simplified.

If you use an existing antique figure get a second picture of the head in true profile. They usually have a turn and will be foreshortened in a single photo. The head photo isn't taken at the same distance as the body. A closer picture is better since there is so much detail. (It will be enlarged independently when you make your full sized drawing.)

Try to hold the camera horizontal when taking the body and head shots. The bottom of the picture provides a reference when laying out grids to enlarge the images. An alternative is to have a helper hold a long level in the image. The level is more easily steadied if one end rests on part of the figure. A long scrap stick from the floor can steady the other end.

Measure the length from rump to chest, without trappings, of the original figure ***and*** from the head from the poll (between the back of the ears) to the lips. You will make a ratio of these to determine how much to enlarge the head photo for the final pattern.

What to Consider When Making Your Own Design

A stander vs. a jumper: Jumpers are technically less challenging since their legs can be a little off. On standers at least three legs must correctly touch the floor. (I go into ways to fix slight errors later.) The straight front leg on standers has a small surface area and involves end grain. This makes it hard to glue and clamp. It is certainly possible to create a good joint but it takes careful preparation.

Leg position on jumpers: Try to design legs that glue underneath the belly. Front legs that stretch way forward need a higher attachment to the torso. This is done by creating an angled plane across the brisket. You see this in old shop photos. (One plane is used for both front legs.) Gluing a leg directly to it would produce an end-grain to end-grain joint, which will never hold. An intermediate panel of wood must be glued to the torso to insure half the seam is surface grain. These joints are never as strong as legs that glue underneath and they are hard to clamp. See diagrams 1a and 1b.

On Rose I had one front leg that could be glued to the bottom of the torso and one that extended forward and high. To avoid a slanted surface I made the extended leg, as far as the knee joint, out of the torso side panel and chest pancake wood. It provided great strength but required a lot more carving to make the leg inset an inch from the body. (The inch provides wood to carve trappings). The knee lap joint had to be made with a hand saw and riffler files. Knee laps are easier when legs are made separately from the body. Then they can be made from two boards of equal thickness laminated together.

With either jumpers or standers, unless your horse has parallel legs, one shoulder or haunch will lead the other. This is not hard to incorporate and keeps the animal from looking stilted. To keep legs in various positions correctly proportioned I create a stick figure over my original small drawing, indicating the animal's joints. The pastern/fetlock area is a problem for many people. See diagram 2.

Note: Front legs that tuck way back under the body are a tempting foot step for kids climbing on. I have replaced many on operating machines.

The Feet

Stander hooves touch the ground and are prone to the toes chipping. Some companies made steep, boxy hooves. More realistic hooves can be protected using custom made 3/8 inch aluminum plates with countersunk screws. An easier solution is to trim off the toe and glue on wood with the grain parallel to the ground. I go into this in the chapter on making legs.

The Head

An extremely tucked head will be difficult to carve between the jaw and front of the neck. The head can be finished before gluing to the neck but the neck is carved after the head is on. Keep the front of the neck simple for easy shaping if the head is tightly tucked.

When I wish to make just a head and neck I include all of the neck, with a slanted plane at the bottom. If it is later put onto a body a slanted surface with an intermediate panel in the torso is used. See diagram 2b.

The mouth: You can simplify carving by making a closed mouth. Open mouths should be as ***wide open*** as possible to facilitate carving inside. Note that a horse's jaw hinges under the ear. A common mistake is to hinge it at the bit. Diagram 3. The upper lip protrudes farther than the lower one but the teeth line up. Diagram 4.

Teeth: There are eight above and eight below. They angle forward and the spaces separating each one would line up if the mouth was closed. There is a natural gap where the bit goes.

The eyes: With a living creature we focus a great deal of attention on the eyes. This distorts our mental image and we think of them as being larger than they actually are. That's why children's drawings have huge eyes. If drawn to accurate scale they will look small and mean. Make eyes at least half again bigger than life size.

The Ears: Most carousel horses have either frontal or rear-facing ears. I like one forward and one back. Wood for forward ears must be glued on with the grain oriented so the tips won't break off. Ears that point back are simply made from the head blank.

The Head Blank

The head blank is separate from the neck to make handling easier during carving. It is also necessary if you want the head turned.

In addition to a turn from a rein pull you can introduce a slight ***tilt*** to the head, so the left ear is higher and you get a better view of the face. This tilt, usually no more than about 7 degrees, adds a lot of visual energy. Rose has

a rein pull to the left with a head tilted to the right. See photos 8 and 9 in chapter 9. For now draw the head in true profile. The pull and tilt are introduced when making pattern pieces. This is covered in chapter 2.

The head seam is best placed just under the cheek and roughly parallel to the horse's face. This produces surface grain for gluing to the neck. It also allows a vise block to be screwed there, producing a good angle for carving.

This seam position does not work for all figures. Flying manes, also called "flame" manes, must have tendrils parallel to the grain in the neck blank or they will snap off. (Be sure to draw the hair in the same direction on both sides.) The neck grain can be anywhere from horizontal to vertical but at least half the head/neck seam must be face grain. When designing your horse carefully consider how the wood and seam must be laid out to achieve this. Refer to diagram 5. (See chapter 4, diagram 2 for how the head seam affects the carving position.)

Manes that lie against the neck don't have to align with the wood grain. Large areas of separated tendrils are tedious to carve since the surface of the neck between them must be smooth and of consistent depth. Limit the separations to the tips of the mane. Roached manes are easy and can be very pretty. See examples in chapter 4; pictures 1, 2, and 14, 15.

I like my forelocks very full. ***Draw them oversized in your plans.*** When transferred to wood there is a real tendency for them to end up skimpier than expected. They can drape over one eye for a "peek-a-boo" effect. I go into how to build that later.

Trappings

American carousels go counter clockwise. Fancier carvings and manes are on the right side since this faced the public. Figures were meant to be viewed from several feet away so trappings are much larger than on a real horse. The saddle should accommodate an adult fanny.

Companies took a lot of artistic license and many trappings would never have stayed on. Have fun! Whimsical figures behind the saddle were popular. The original inspiration was the leopard saddle pads that European cavalry officers used in the 1800's. The stuffed head stuck out behind the cantle. Carvers lost track of the original reason for these feline heads and

put on dog heads, ears of corn, even a Chinaman's face with the bottoms of his feet at his ears!

If you want a figure behind the saddle it is helpful to have an element with a fudge factor between it and the saddle back. In a big block of wood it can be hard to carve things in exactly the right place. I used a folded blanket on "Hunter". On "Rose" I placed a bolster pillow with some squish in it. This way the rabbit or cherub could end up slightly off and the space between adapted easily.

Some trappings are more challenging than others. Anything that has straight lines or is geometric, such as straps, buckles, and armor plates, must be done carefully. Ribbons, bows, tassels, and flowers are less demanding since their final shapes are subject to the artist's whim.

Be thoughtful in placing something like a diamond pattern on a saddle pad that has a girth over it. Moving the pattern slightly can prevent the piping (small grooves) from ending up in a difficult spot to make. ***Maintain the integrity of the pattern under whatever overlaps it.***

Avoid anything too fancy on the chest or rump. They involve carving end grain and can be difficult. A simple chest strap can be easily enhanced using a large jewel with a raised collar. Jewels are available online.

If you run a strap around the rump it should remain connected to the horse across the groove that divides the rear legs. Cutting the wood away here makes a convenient hand hold that can easily be broken.

The Pole

Poles are made from plumber's pipe, which is sold by <u>inside</u> diameter. Standers use ¾ inch pipe with an outside diameter just over one inch. Jumpers need sturdier 1¼ inch pipe with a 1 5/8ths inch outside diameter.

I buy a 5 foot pipe at the hardware store. This standard length comes with threads at each end. One end will be trimmed later. The lower end will keep its treads so purchase a flange and <u>always</u> keep it on to protect them. Buy a second three-foot length for quick-checking the pole holes.

When designing clearance between the mane and pole don't forget the brass sleeves are going to add some width. Brass sleeves are sold in 1½ and 2 inch diameters. To prevent the mane touching the pole some companies made the lower half of the manes run forward tightly against the neck. More commonly the pole was moved back into the saddle.

Unless you design a cut back pommel, which actually occurs on real saddles, draw the saddle so no more than half the pole goes into it. Diagram 6. Putting the hole too far into the saddle can cause it to split out under pressure from the pole. Diagram 7. Draw the upper hole to allow the pipe to slide easily but not be so big the brass will slip right through the animal. (The very top of the hole will be slightly enlarged later to let the brass sleeve seat a little way into the animal.)

Cutting the hole into the pommel will change its profile so this area is left flat until after the hole is cut. The flat area is also useful to seat a jig that will drill straight down. Mark the area in a horizontal dotted line when you make your large drawing to remind you to leave this wood. After the hole is made and the torso blank is glued up the pommel is carved with a pleasant side view. See picture one.

Lower holes in jumpers: Jumpers have a support pin, which runs side to side, with a four inch washer above it to distribute the weight. If the washer goes partly over the girth it will not lie flat. Either the girth can be drawn farther forward or a small crescent can be cut out of it. This won't be seen when viewed from the side. The pin must still end up (under the washer) at the belly, not on the girth.

On jumpers the rear of the hole will determine the angle of the horse on the stand since the back end is heavier. It must be carefully located or the animal will tilt and the pole will hit the mane. On a large figure you should aim for wood thickness of about 2 inches at the back of the lower pole. If you end up carving much of the belly thickness away glue and screw a stop block inside the torso. On a stander the lower hole can be oversized since it doesn't bear any weight.

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The Tail

Tails can be hair or wood. Hair tails come salt cured or tanned. Salt cured tails can get rank in humid conditions so I don't use them. All tails look better if the area around the hole is raised.

Tails remain removable for painting or replacement. Hair tails are attached to a wood bung with a pan head screw. A 1¼ inch dowel about 6 inches long works well. The bung extends beyond the tail leather and farther into the animal. The tail hole is cut at a slightly downward angle and the bung goes in about 4 inches. A screw is run into it from between the legs to hold it in place. The remaining 2 inches can be hidden under the tail hair to lift it, giving the horse a proud look.

The size of the hole must accommodate the leather and bung so it is helpful to have this assembled before you finish your full sized pattern. The raised wood "collar" around it needs a thickness of about ¼" to 3/8" inch so it doesn't break out. Wood tails also go into an angled hole. I talk more about wooden tails later on.

A few suggestions on proportions

Carousel figures are slab sided and narrow. A typical horse has a torso ratio of length to width (**without trappings**) of about 3.5 to 1. The torso length is measured from rump to chest. My carving torsos are 42 inches long and 14 inches wide. This provides a 12" body plus one inch on each side for trappings. Additional wood for special features is laminated on later.

Below I have provided measurements for a typical horse from my studio.

Torso length *without* trappings or tail collar: 42"
Torso width: 14**",** (12" for the body plus 2" for trappings), (0.33 times torso length)
Head: 15" length, (0.357 times torso)
Torso depth: 17" from withers to belly, **not** including saddle (0.4 times torso length).
Head width: (at upper eyelids): 6 1/4" (0.417 times head length)
Outer edge of ears: 7 ½" (0.5 times head length)
Outside nostrils at widest: 4 1/2" (0.3 times head length)
Cheeks: 5 ½" (0.37 times head length)

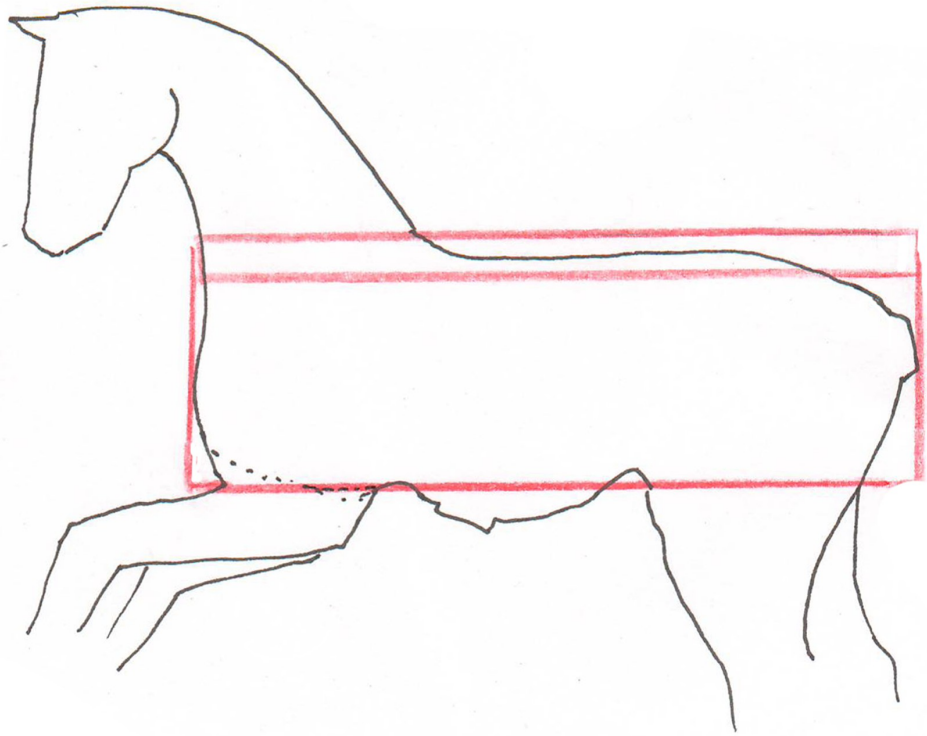
Upper lip at bit: 4” (0.26 times head length)
Distance of stander belly to floor without girth: 21” floor to belly (0.5 the torso)
Front leg stander center of elbow to floor: 22”

Leg measurements on a 42 inch torso:

Front leg elbow to knee: 9 ½” (0.226 times torso)
Front leg knee to center of fetlock: 8” (0.19 times torso)
Stifle to center of hock: 12” (0.285 times torso)
Center of hock to center of fetlock: 9 ½” Note: Rear cannon bones are longer than front ones. (0.226 times torso)
Width of knees: 3”
Width of hocks: 3”
Width of fetlocks: 2 ½”
Width of pastern: 2” at the thinnest spot
Width of coronary bands: 3”
Width of hooves at bottom: 3 ¼”
Height of hooves: 2” measured **straight down** from intersection with front of coronary band.

Chapter 1, dia. 1a

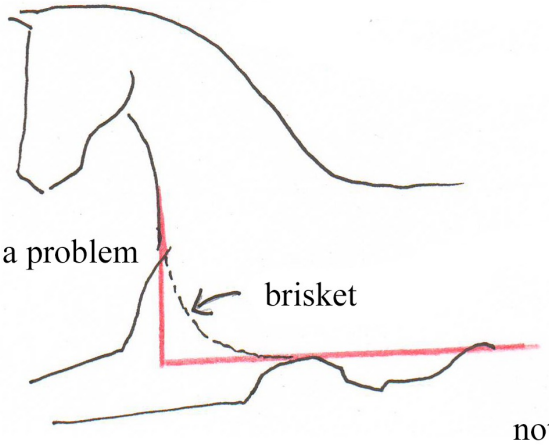
Leg Position



attaching legs to the under belly is the strongest, easiest construction

Chapter 1, dia. 1b

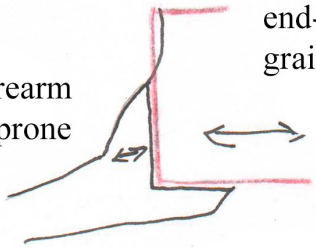
Front Leg Attachments



extended front legs pose a problem

brisket

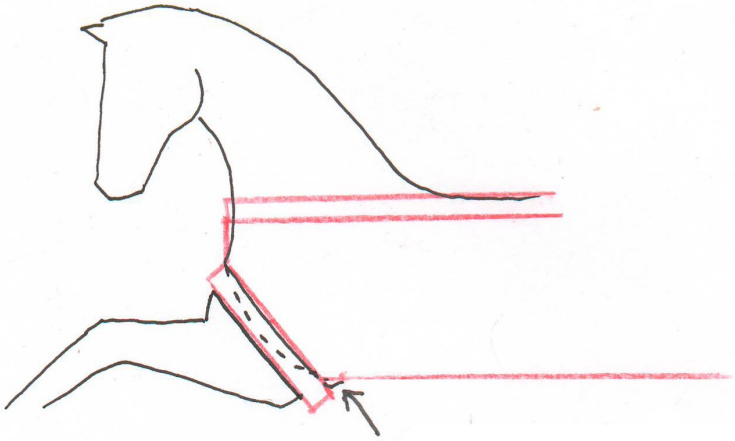
notching a forearm produces too much end-to-end grain gluing



the upper forearm will also be prone to breaking

the solution is to cut the torso at an angle and incorporate a panel at the seam.

the panel must include the entire brisket

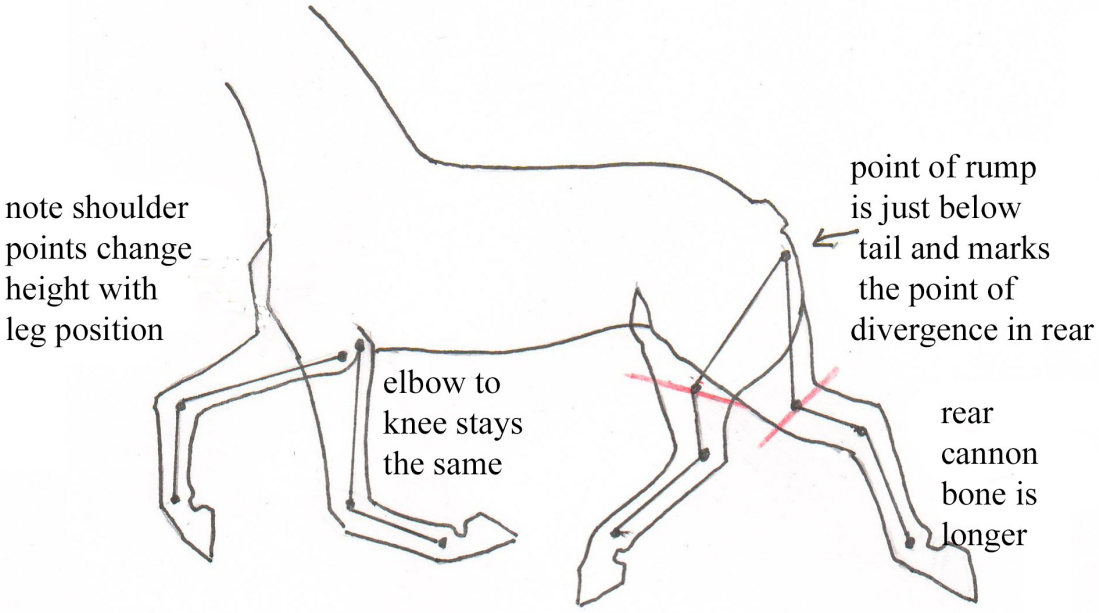


sometimes an extra wedge of wood must be added behind the elbow

Chapter 1, dia. 2

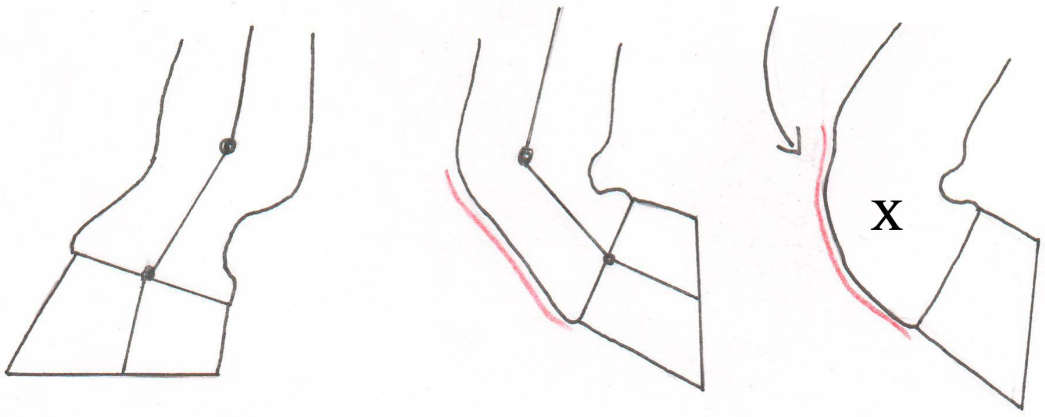
Length of Legs

to keep legs in different positions equal
make a point to point stick figure as shown


note shoulder points change height with leg position
point of rump is just below tail and marks the point of divergence in rear
elbow to knee stays the same
rear cannon bone is longer

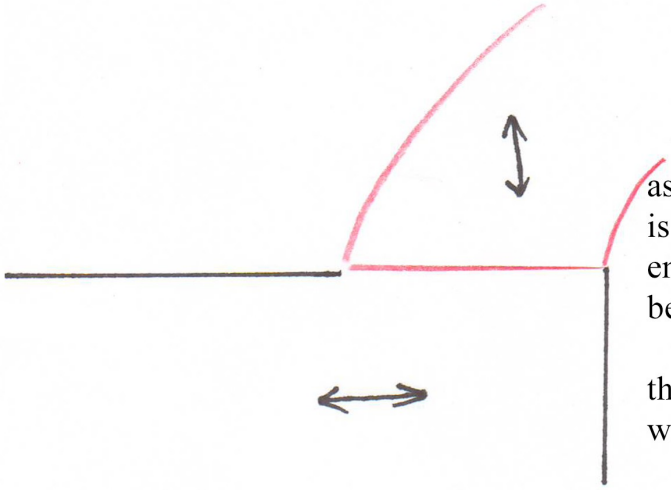
Lower legs :

rounding of the pastern is a common mistake



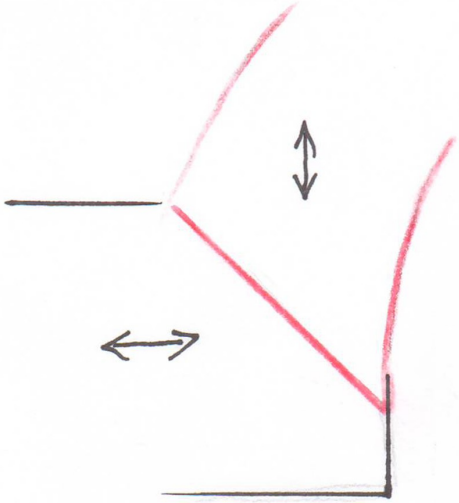
Chapter 1, dia. 2b

Neck/Torso Seams

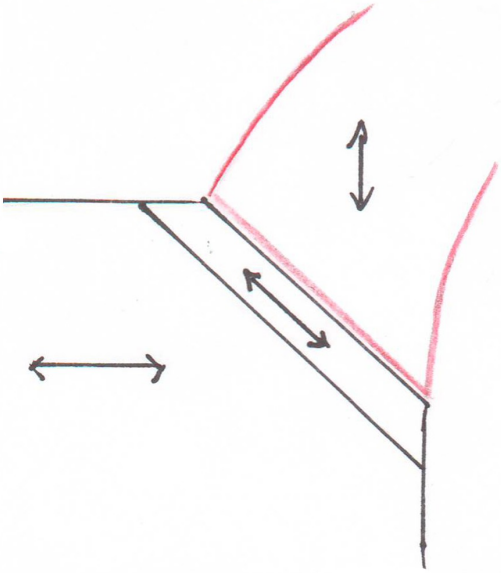


as long as one face is surface grain an end grain piece can be glued to it.

this assemblage will work



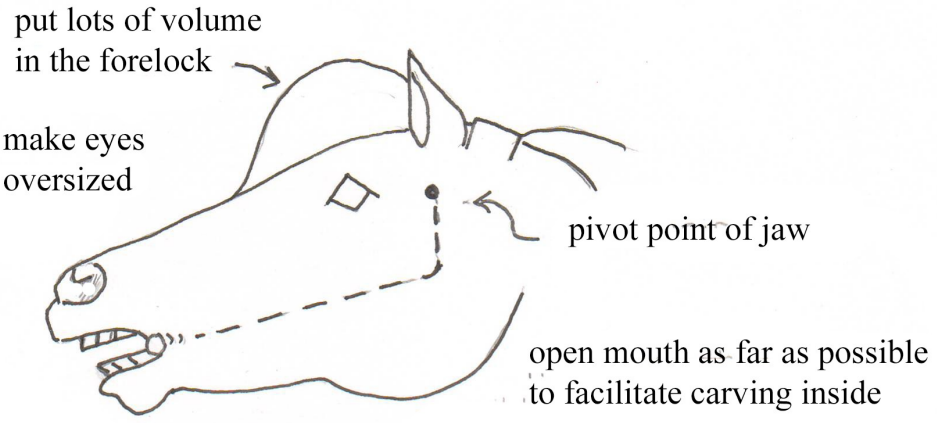
this angled seam produces too much end to end grain gluing



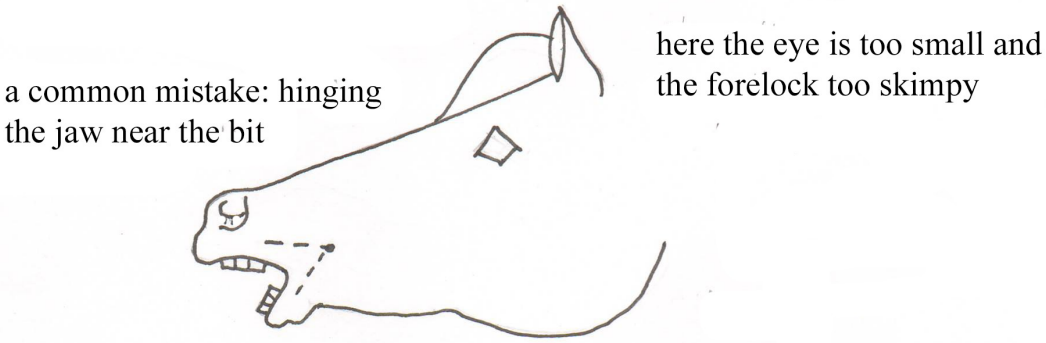
an intermediate panel is incorporated, providing end-to-face gluing

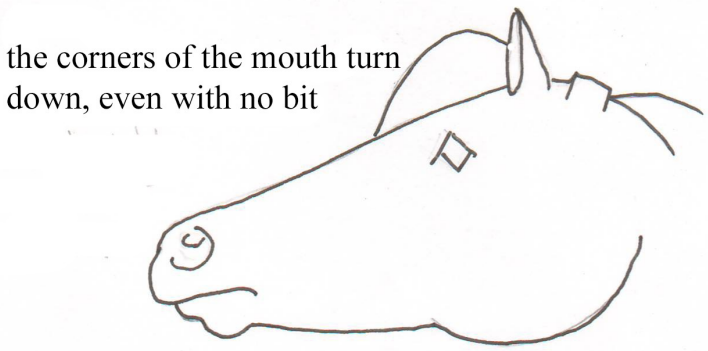
Chapter 1, dia. 3

Drawing the Head



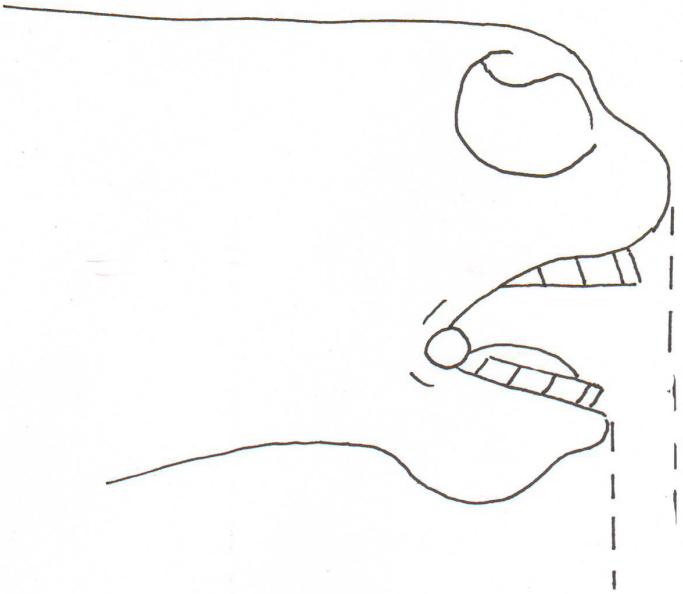
upper lip extends over lower
one but teeth line up





Chapter 1, dia 4

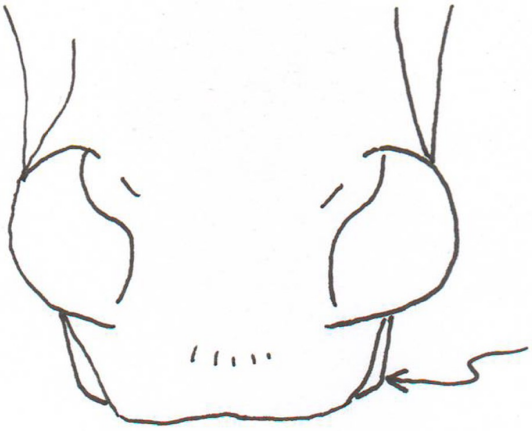
The Mouth



upper lip extends beyond lower one

when the mouth closes the teeth and grooves should line up

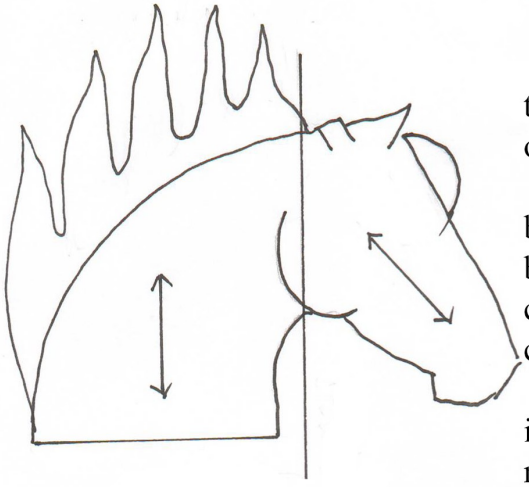
from above the lower lip is squared off more than the upper



Chapter 1, dia. 5

Flame Manes and Head Position

the head/neck seam is acceptable but the tendrils are prone to breaking off

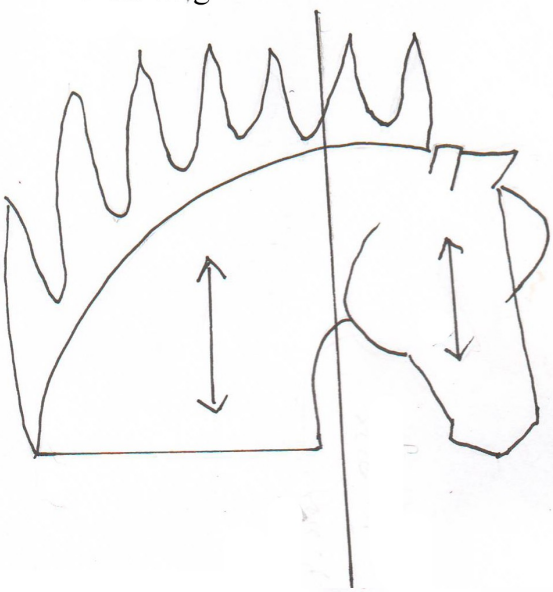


this seam line puts all the tendrils on the neck blank

bridle elements like tassels can be hard to carve because of the change in grain direction on the cheek

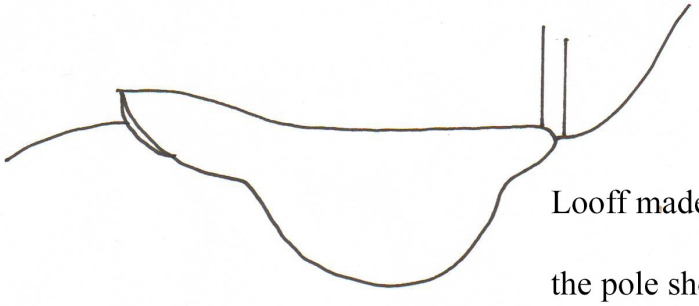
it also forces the head to be mounted at a more challenging angle in the vise for carving

tucking the head so the grain is parallel in both pieces and is aligned with the tendrils solves many problems



Chapter 1, dia. 6

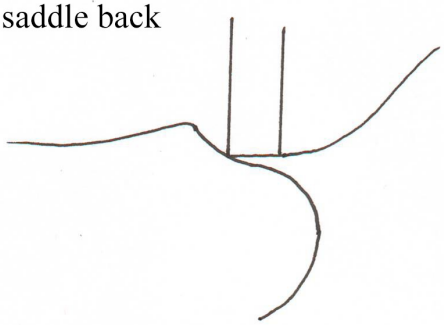
Pommel Options

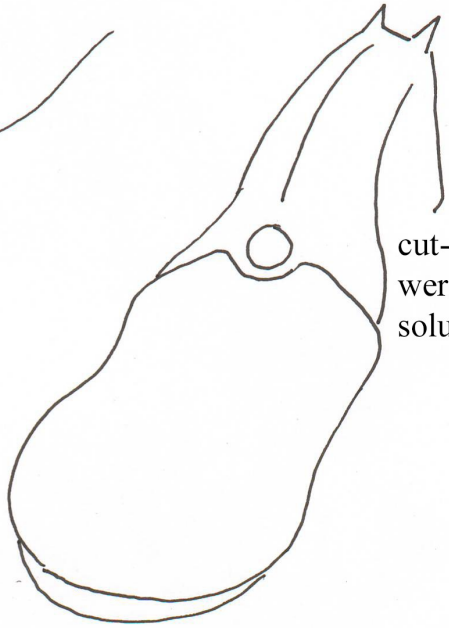


Looff made flat pommels

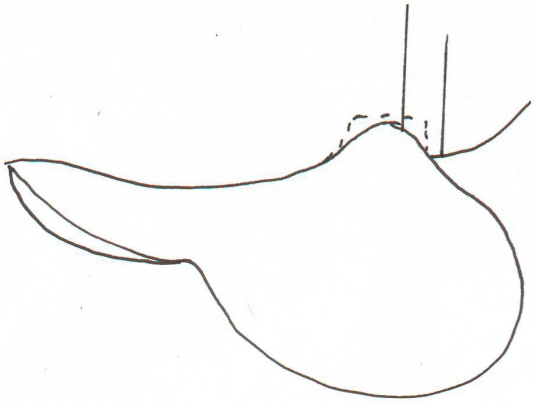
the pole should still not be more than half way into the saddle

some designs simply move the saddle back





cut-back pommels were another solution



leave the pole area flat until the hole is made, then shape the saddle afterward

Chapter 1, dia. 7

Problems with Poles in Pommels

top view

if the pole is more than half way in
pressure can snap off the pommel

Chapter 1, picture 1

This ended up as a cutback pommel. Wood around the hole was cut away so the pole did not apply any pressure to the saddle. Otherwise this hole would be too far back in the figure. The red markings inside the hole are explained later.

CHAPTER 2

CREATING A FULL SIZED DRAWING

This chapter covers enlarging a sketch or photos to full size and cutting it into pattern pieces.

You need dark pencils, a fine felt-tip pen, and two really big pieces of paper (one for each side). Use transparent tape if you have to put several pieces together. The paper should be white and have a surface that will stand up to erasing**.** ***It should not be completely opaque.*** Because the final templates for the two sides need to be exactly the same size one side is made first, then flipped over on a picture window and traced to the second piece of paper. Do not try to enlarge the two sides individually.

Making the initial small sketch

Any pull or tilting of the head is introduced when building the carving blank. If you are designing your own horse draw the head in a straight forward position for now. Working from two photographs of an existing figure is covered below.

Drawing grids

Opaque projectors create distortion around the edges so I use the grid method to enlarge images. Grids are used by referring to where they intersect the drawing underneath.

The size of the grid is a matter of personal preference. Make them over the sketch or photo at a size that will allow you to transfer the image without too much guess work. My initial drawings take up most of an 8½ by 11 piece of paper, orienting the pole vertically and the belly line horizontal. I then make about 14 squares across it, also parallel to the floor, and extend them vertically to cover the entire figure. The squares can fall anywhere but it is convenient to have the corners of one set be fairly near the center of the drawing.

Working with Photos

Two photos are used with an existing figure. One is taken of the whole body and a second is taken of the head in true profile. Photos are easier to work from by enlarging them and making a tracing-paper image.

Make the grids parallel with the floor in both body and head shots. The bottom edges of the photos are a guide if you did not have a long level included in the pictures.

Grids over the head photo should be smaller because there is more detail. Although the grids can fall anywhere on the body the head grids should begin with ***the corner of one square right at the poll*** of the head. I will go into how to incorporate the two grid sizes in your full sized drawing. For now concentrate on getting the body of the horse enlarged.

Transferring Grids to the Full Sized Paper

Pin one of the large sheets of paper on a wall. Start by making a mark fairly near the middle of the paper. This does not need to be exact. Begin your grids from there, working out in all directions. They need to be horizontal. The size of the squares is determined by a ratio of the small drawing to the full sized carving. Mark the length of your proposed full-sized torso, (rump to chest without trappings), on the large paper and measure it.

Put all measurements in inches, not feet and inches. Convert fractions of an inch, like 3/8ths, into decimals by dividing the top number by the lower one. Three divided by eight is 0.375. Three feet, two and 3/8ths inches would be 38.375 inches.

Give thanks for calculators and divide the full sized torso by the torso of the small drawing or photograph. If your full-sized torso is 2.75 times larger than the small drawing, the new squares will be 2.75 times the size of the smaller ones. Draw the grids onto the large paper horizontally, parallel to the floor. Use colored pencil to avoid later confusing the lines with trappings and pole. If you work from a sketch include grids in the head area since you can draw the head right on from it. See diagram one.

Tip: You will repeatedly go back and forth from the small sketch to the full sized drawing. For easier reference make a small colored circle at the corner of one of the squares near the center of the small sketch. Put another one on a central square on the large paper. You can see this in blue on diagram one. Starting from this square, transfer a mark to the large paper where each line of the small sketch crosses a grid-line. Then connect the marks by eye. Use a light pencil to make corrections easier.

Note: Mistakes on the small drawing will also be enlarged so you may need to tweak the large drawing. This is especially so with leg length. Do this with a stick figure over it as you did in the small sketch.

If trappings are too detailed to draw accurately in the small sketch create ***simple outlines of their size and location*** and transfer these to the large drawing. Notice the circles where roses will be in diagram one.

Create accurate drawings for small details by making an intermediate larger drawing on bigger paper. I use a large sketch pad, working in sections. Diagram 2a and 2b. Make a new grid on the intermediate paper. Surprisingly the grid size is not important so long as the new paper has the same number of squares as the small drawing. This grid is only for enlarging the small sketch enough to refine details. It is not transferred to the full sized paper. Light outlines for the areas to be detailed are already on the full sized drawing. Use these as a guide and draw the finished details on by eye.

Making the Large Drawing from Photographs.

If you are working from photographs the head will have been taken from a different distance than the body. Draw the body grids on the large paper up to and including the poll between the ears. Enlarge the image of the body as far as the top of the neck and mark the spot of the poll.

Adding the head: Begin with the ratio of the <u>original</u> animal's head to its torso. Use this on the length of your own torso to establish how long the head should be in a straight ahead position. Divide **this** head length by the length in the photo for a new ratio of grids for the large drawing in the head area. Put the new grids on the same horizontal plane, **starting with one corner at the horse's poll**. This allows you to transfer the small image to the correct location on the large paper. The head will still be in true profile.

Since I use my own designs, once I have decided on the head/neck I often make a small, straight-ahead model of it in non-drying clay. I photograph the model, make a tracing of the picture, and draw grids over it. Here I extend the grids over the neck too. To position it on the large paper I start these grids at the intersection of the topline of the neck and withers rather than the poll. The grids on the large paper will be a different size than the rest of the body. They must be drawn with one corner at the topline/neck.

Any grids that have encroached into the area from enlarging the body are simply erased. Keep the new squares horizontal, just like the body grids.

I keep the model for reference when carving hair and determining widths later, using the model head length to the head in my large drawing for a ratio to multiply width measurements. A model of about four inches from lips to poll works well. One is shown in chapter 4, picture 4. I don't put trappings on, it is just too small.

Fine Tuning the First Side

For now you will only be making a full-sized drawing of the fancy side. If one shoulder or haunch is "hidden" put it in with a dotted line. Also dot the topline of the animal, even under the saddle. Do the same for the brisket (chest) and for the groove between the rear legs. Draw a **horizontal** dotted line across the top of the pommel as a reminder to leave that area un-carved.

Note: It is easier to decide the final height of a jumper while the drawing is pinned on a wall. Draw a line on the paper indicating the floor. Remember a rolling base can add several inches to the overall height.

Draw all four legs and check the lengths with a stick figure as shown in chapter one, diagram 2. For hoof profiles use tracing paper over one full-sized foot and make a Manila pattern piece to reproduce the others. In chapter 1, diagram two, I have shown the points and lines to use when adjusting the bend at the pastern. Put all the trappings on now.

Note: Trappings like armor scales can only be drawn accurately on the sides. The rest are drawn right onto the wood after the animal is rounded, using a single Manila pattern piece and laying it out repeatedly.

Straps on the chest and rump do not go straight across. One shoulder may be higher and there is always a slight sag in the strap. To have enough wood the paper template must be drawn ***with extra strap width*** below it at the front. Rear straps usually go straight across. See diagram 3. Include extra wood for the raised area around the tail hole.

Once you are satisfied you can darken the drawing with a felt tip pen. ***Do not copy it to make a second side yet. Seams and registration marks for the cap and belly wood panels must be drawn on first.***

Making the Second Side
Cutting Pattern Pieces

A carousel torso is a hollow box. The sides are ***capped*** by a top panel but the belly panel fits up ***in between*** the sides. (They do not need to be the same thickness). The side panels therefore run from the underside of the cap panel (which later has more wood added for the saddle), to the bottom of the belly panel. The chest and rump are made of a stack of short pancake pieces ***with the wood grain parallel*** to the sides, (running front to back). Two and one half by 2 ½ inch reinforcement strips are added inside the box to prevent carving through when rounding.

Most parts of a carousel horse are made of panels consisting of two or more boards edge-glued and planed flat. The drawing of the first side cannot be duplicated until the thickness of the cap and belly panels have been established since where they fall must be exactly copied to the second side. If any panel is too wide to machine plane go to chapter five on building and flattening panels by hand.

The belly piece will lie along the best place for leg attachment. The lower surface is referred to as *the belly reference line.* It must be horizontal! The grid lines will be a guide. It will not include a piece of wood for the belly/ girth, that is added after the legs have been dry fit to the torso. Wood behind the elbows and in front of the stifle gets carved out of the belly panel. If you place it too low you will end up carving through. Diagrams 4 and 5 show the proper layout. (I neglected to show some registration lines from the cap-to-neck and belly-to-legs in these diagrams.) This line must be drawn onto the paper.

Tip: Leave the wood a bit long to allow for slippage. It requires major redesigning if it ends up short.

Place your full sized drawing on the floor, trapping's side up. Put the belly panel on edge along the ***inside*** of the belly reference line. Check it to be sure it is low enough for wood behind the elbows and in front of the stifles to be cut out, but not through, it.

With colored pencil trace all the way around the belly piece onto the paper. Make the lower surface in a solid line but indicate the upper surface in a dotted line. Unlike the cap you will ***not*** cut the paper here. (Later copy the

upper and lower surfaces of the belly to the inside and outside of both side templates.)

Make a reference mark from the side paper to the belly and girth/belly piece since you will be cutting it off. Place this near the center of the torso. If placed too far forward or back the chest and rear pancakes might later cover the line. Run this mark across the bottom of the belly wood so it can't get lost in carving. Make another reference mark from the belly to the side paper at the inside of the belly piece, also near the body's center.

Extend the belly panel reference mark ***all the way*** around the wood as seen in diagram four. It is needed to properly register the two side pieces when you glue up the torso.

Put the cap panel on its edge so it covers the rump and withers but not the pommel and cantle. If it looks like you might carve through the saddle seat simply redraw the seat higher. Be sure the cap is long enough to include the front line of an extended neck.

The cap ***must be parallel*** to the belly piece. If the two panels are not on the same plane it causes problems when drilling the pole hole. With a colored pencil trace all the way around the cap onto the paper. Make registration marks from the wood to the paper side and neck. As you did for the belly, don't make the side reference mark too close to the front or the rear. Extend the side mark all the way around the cap wood as seen in diagram four. The cap to neck mark must also be extended across the wood but only needs to run across the top of the board.

Label each leg and which surfaces face out. Be sure you have reference lines across the leg seems.

If the front legs stretch forward they come off the torso higher up and need a slanted surface at the chest. A panel is incorporated into the torso here to avoid an end-grain/end-grain seam with the legs. If the legs come off at different heights you still make only one plane across the chest. Its position is determined by the highest attaching leg. The panel **must include** the entire front of the chest between the legs. Align the grain with the long axis of the torso, not side to side.

The neck to head seam: Decide on the head/neck seam and indicate on the paper how the grain is oriented in each piece. At least one half of the seam must be surface grain! You may need to change the angle of the seam, the neck grain or head grain, or even change the head to a different position. The neck blank can be anywhere from vertical to horizontal but "flame-maned" grain has to be oriented to provide strength for the tendrils.

Note: I discourage a head seam that runs from behind the ear bases (the poll) to the throatlatch. This makes the head end-grain and the carving blank hard to work on in the vise. Back-pointing ears will end up on the neck blank which may produce weak ear tips.

A seam close to parallel with the long axis of the head and placed under the cheeks will be very close to surface grain. A clamping block for the vise can be screwed there to provide a convenient orientation for carving. Diagram 2. (To get under the jaw slide the head beyond the edge of the bench vise.)

Dot along the top-line of the neck, which can be concealed by the mane in places on one side but not the other. Don't forget to run a registration mark on the paper across the head/neck seam.

Pancakes of wood will fill the rump and chest. They do not require pattern pieces. Hold off making them until later when short scraps are abundant. I talk about them in chapter 5.

Duplicating the Second Side

Darken all registration marks and seam locations. Flip the entire drawing on a picture window, cover with the second sheet of paper, and trace it**.** Transfer where the cap and belly panels are and ***all your reference marks!*** There is no need to copy all four legs, just the two on the second side. Transfer appropriate trappings.

After duplicating the registration marks the legs, neck, cap, and belly/girth pieces can be cut off both full sized drawings. Be sure not to cut the sides along the inner (dotted line) surface of the belly board. See diagram 6. The extra legs on the first side can be thrown away.

Tip: I keep legs and small pieces pinned to a corkboard so I don't lose them. Duplicate pieces for the saddle and belly/girth don't need to be saved.

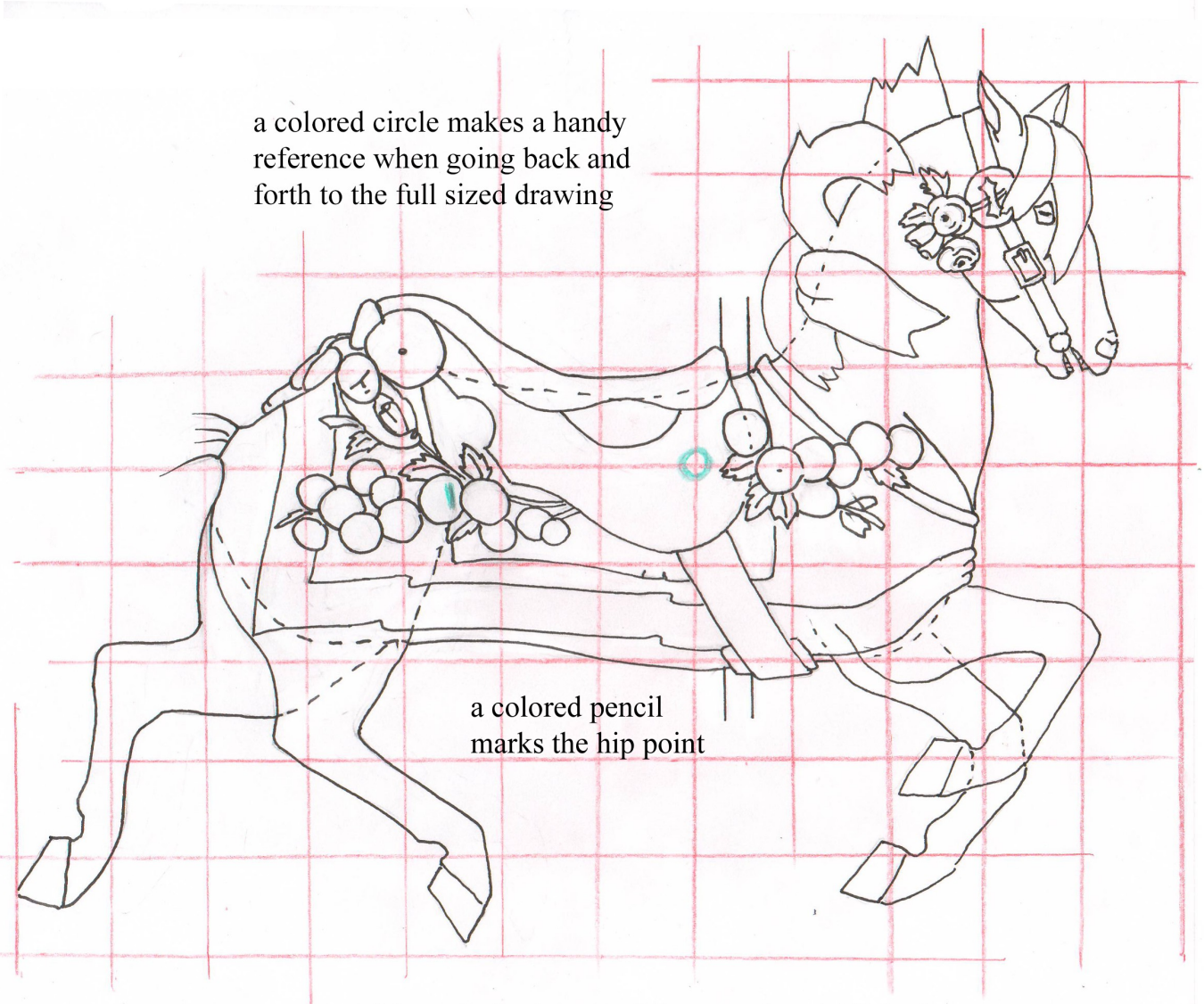
Copy the dotted line for the upper surface of the belly panel to the inside of the second side-template. Cut the front and rear of the side patterns along the drawing. Remember to leave extra wood for strap sags and the raised collar at the tail hole.

I keep only one paper template for the head but I save the patterns for each side of the neck. This way I can be sure of the top line, know how to carve muscles, and insure tendrils on a flying mane are going in the same direction.

With a simple rein pull nothing has to be done with the neck patterns. If you want a tilted head (left ear higher) then longer boards must be made on the left side of the neck. This will not show up on your paper. After cutting off the head, tape more paper to the top of the neck and add about an inch. This is a reminder to make longer boards on the left half. Later you will trim some wood off the right side to create a flat surface for the head. Diagram 7.

Chapter 2, dia. 1

Grid on Small Drawing


a colored circle makes a handy
reference when going back and
forth to the full sized drawing
a colored pencil
marks the hip point

at this scale the layout of the roses is established

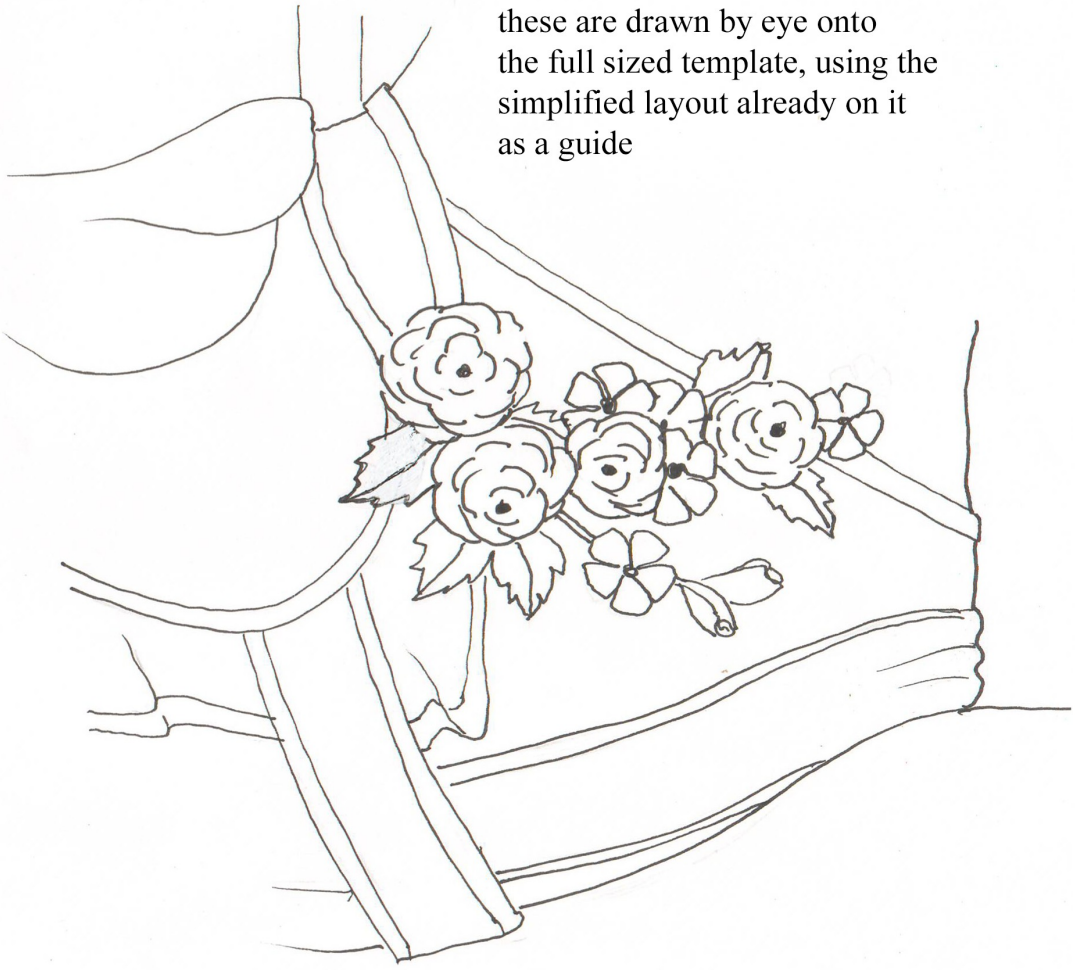
once enlarged to full size more details will be laid on

Chapter 2, dia. 2a

Refining Details

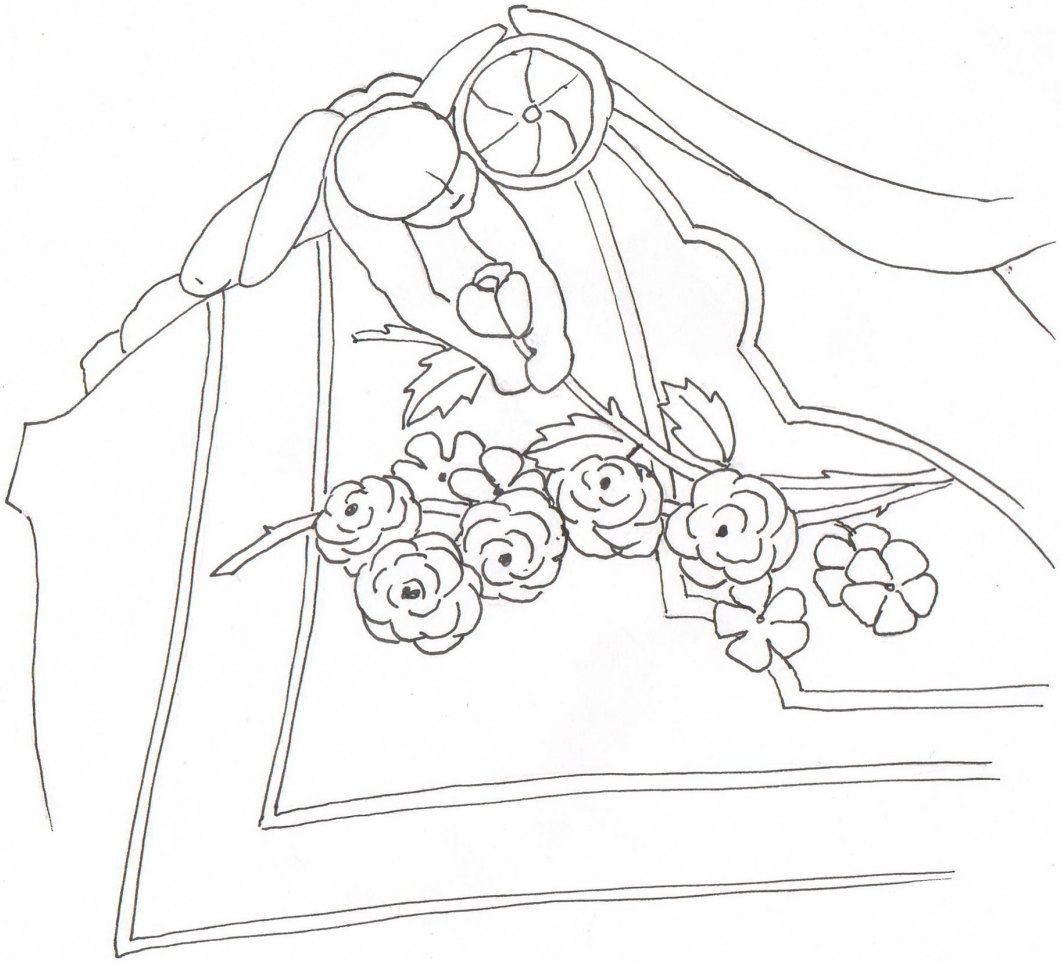
I often use an intermediate grid size (not shown here)
and enlarge an area of the small drawing to refine details

these are drawn by eye onto
the full sized template, using the
simplified layout already on it
as a guide



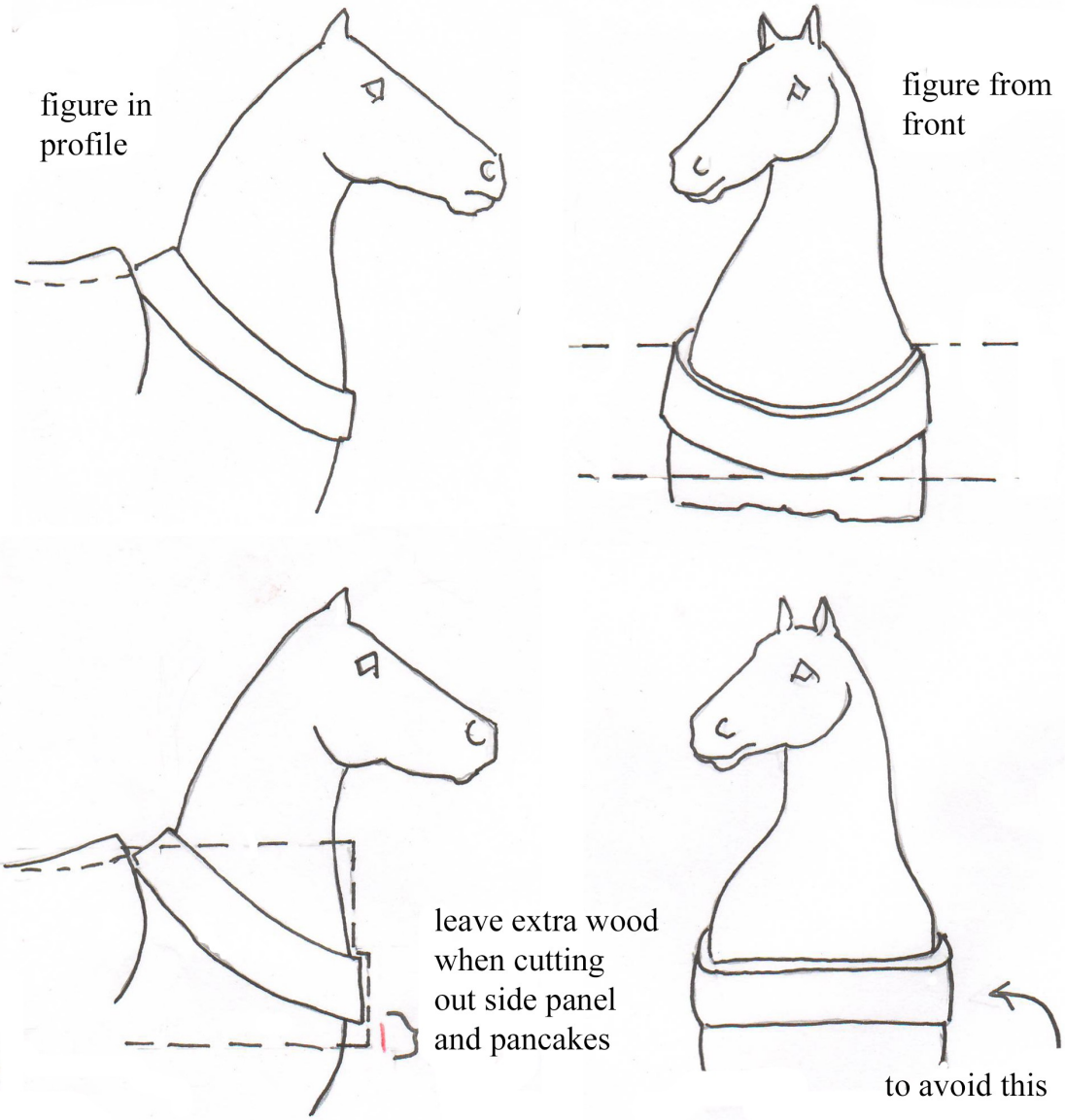
Chapter 2, dia. 2b

An intermediate detailed enlargement
for the roses and cherub on Rose



Chapter 2, dia. 3

Chest Strap Layout

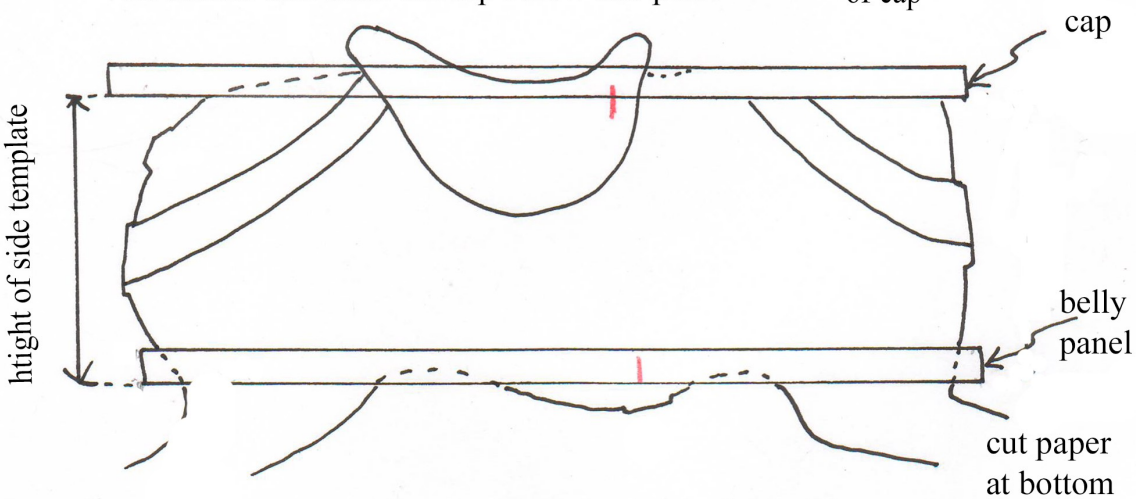


Chapter 2, dia. 4

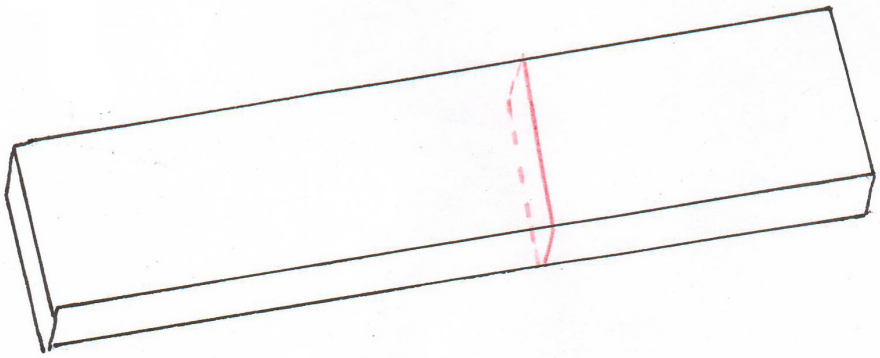
Creating the Side Panels

to make a pattern piece for the side begin cut along undeside of cap

the cap panel should incorprate top of rump, the saddle seat must not dip below this piece



Be sure to apply registration marks across all seams, including legs and cap to side and neck.



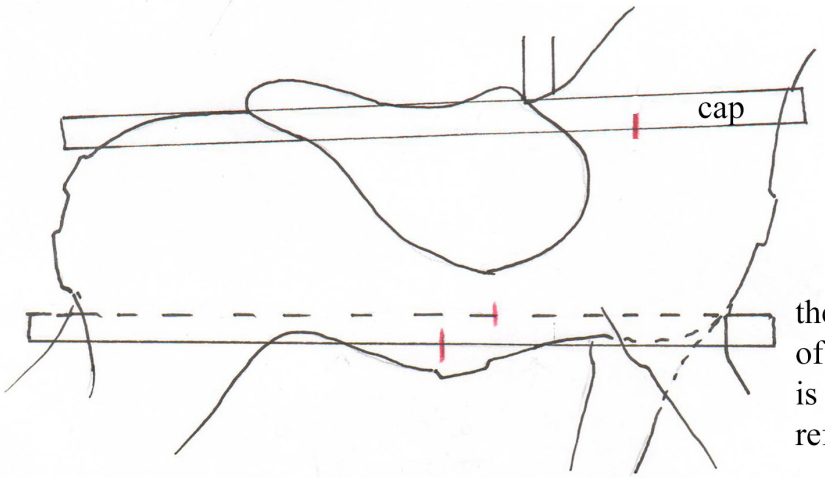
run registration marks around belly, side, and cap panels

(neck registration marks should be extended across the top of the cap pannel, not shown here)

Chapter 2 dia. 5

Belly Reference Line and Cap Panel

the cap includes the rump, the saddle
should not dip below the lower face

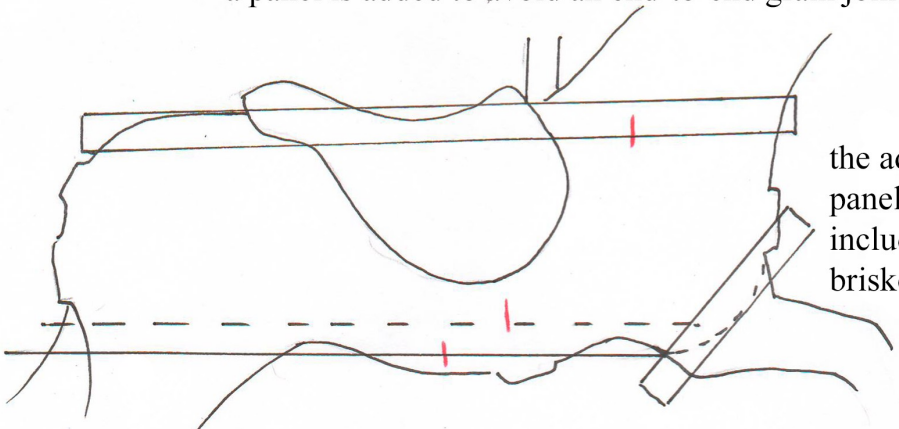


the bottom
of the belly panel
is the belly
reference line

the belly reference line should include the brisket but be below
the areas behind the elbows and in front of the rear legs

wood is added for the belly/girth later

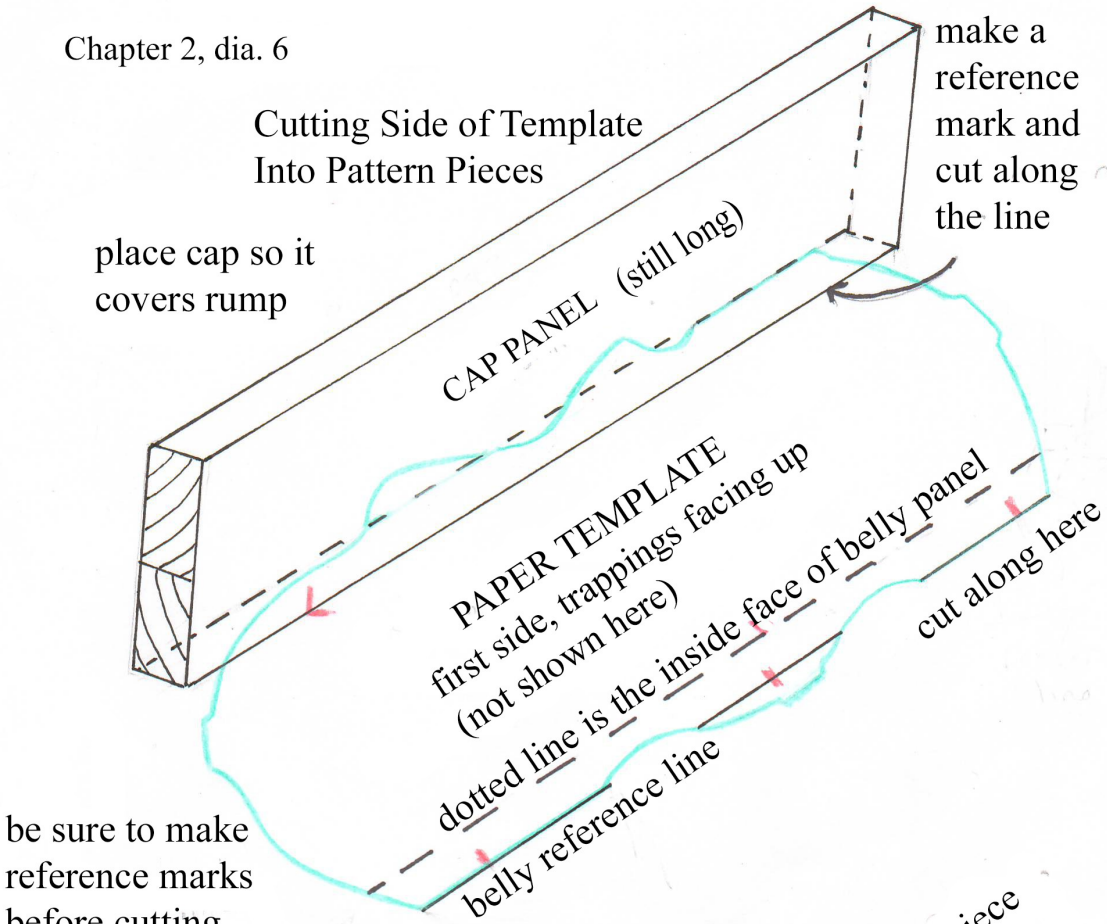
with forward reaching legs the torso is cut at an angle and
a panel is added to avoid an end-to-end grain joint

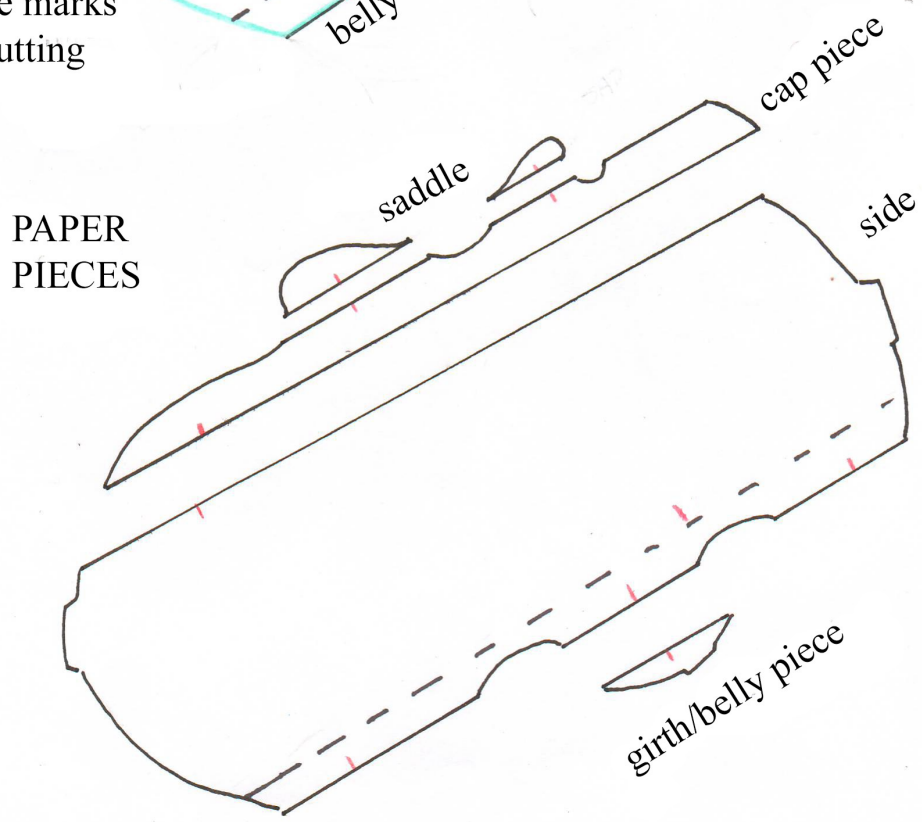


the added
panel should
include the
brisket/chest

red lines show only some of the reference marks that must be drawn before
the paper template is cut up

Chapter 2, dia. 6


Cutting Side of Template
Into Pattern Pieces
make a reference mark and cut along the line
place cap so it covers rump
CAP PANEL (still long)
PAPER TEMPLATE
first side, trappings facing up
(not shown here)
dotted line is the inside face of belly panel
cut along here
belly reference line
be sure to make reference marks before cutting

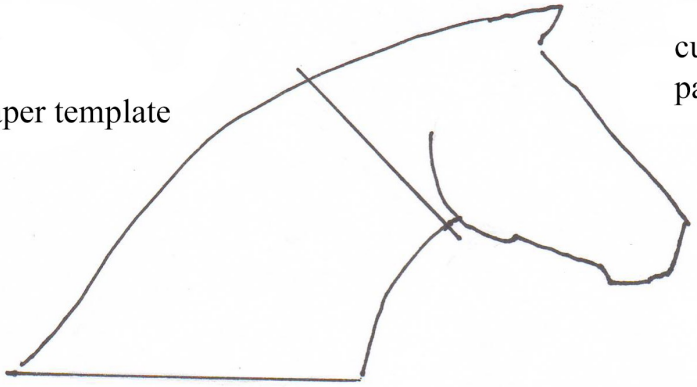


Chapter 2, dia. 7

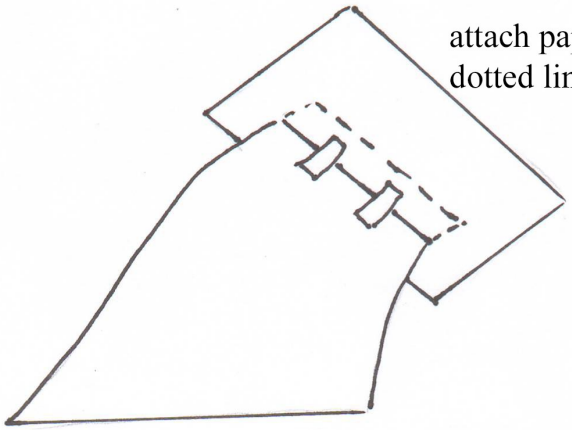
Extending Template for Tilted Head

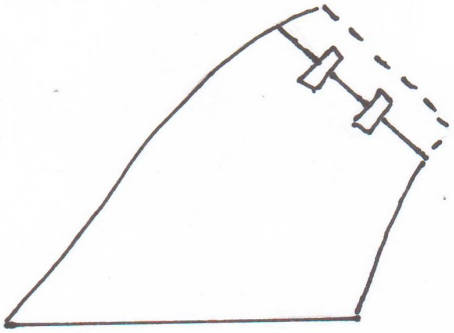
initial paper template

cut seam close to parallel with face



attach paper to neck, draw on extension with a dotted line and trim, (it won't take much)



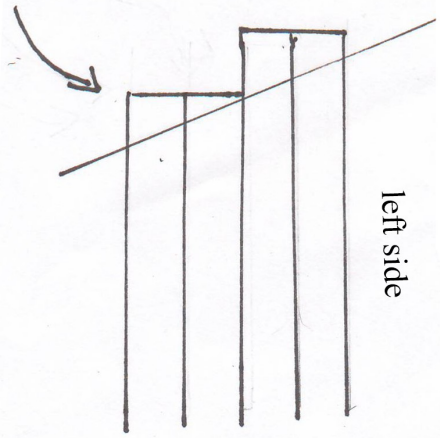


use extended template for left half of carving blank

Front View of Neck Blank

trim wood along slanted line

(angle is exaggerated)



CHAPTER 3

MATERIALS AND EQUIPMENT

The Wood

Several types of wood can be used but basswood (American Linden) is the best, being lightweight and having little grain. There is a European basswood, which is sometimes called Lime wood, not to be confused with the fruiting lime tree. It is a bit denser but not available in the U.S.

Another option is Sugar Pine but growth rings and sap pockets make carving and sanding difficult. Poplar was used by one of the old manufacturers and I tried it once. It was sticky to carve, slow to sand, and heavy. Basswood and Poplar both look muddy when stained.

Basswood disintegrates quickly once harvested. Buy it surfaced on four sides (S4S) and don't accept any with light splotches as this is a sign it has begun to break down and will be impossible to carve. Get as much as possible the same thickness. I order 7/4 inch. Purchase about 20 percent more than you think you need. I've gotten nice basswood by mail order from Garrison Lumber in Bath, NY. Order the pieces for the sides, cap, and belly longer than needed. You will be sliding them back and forth to move defects out of areas that get a lot of detail.

American Linden boards vary somewhat in density. To select a board that will be good for details make two close parallel lines across the grain with a sharp veining tool and see how well the ridge holds up. Softer boards can be used on legs and other parts that are simpler.

Wider boards are appealing because there is less edge gluing but they sell at a premium and are more prone to warp. An old adage is the end rings will try to "straighten out" as the wood dries. The best boards have the least curvature in the end rings. End grain that is straight and 45 degrees or more to the faces is called quarter sawn. (Lumber yards call this "straight vertical grain" because of its appearance when stacked on a pallet).

Quarter sawn will move the least with humidity changes. Because of the way the tree is milled these boards are generally narrower. It is preferable to edge glue several pieces than have a single wide board with curved rings. A board with grain

that is fairly straight and almost parallel to the faces is flat sawn. This is the second most stable. See diagram one.

Glue

White Elmer's Glue-All (polyvinyl acetate) is not the strongest but it dries softer than other glues and is easier on tool edges. A quart will do a large figure. I keep a small bottle topped up from a larger one so I don't wait forever when I tip it up.

Titebond Original yellow glue is applied where maximum strength is needed. ***All glues used must allow thinning with water and not dry waterproof,*** (labeled as good for exterior work.) Carefully check the bottle since glues can look the same but be quite different. If waterproof glue sits on wood, even if scraped off when wet, it seals the wood and cannot be reactivated to add more wood. Titebond II and Gorilla glue are ***not*** options.

Sandpaper

I use Aluminum Oxide paper from 50-grit through 100-grit. Garnet paper dulls too quickly. Peel and stick sandpaper has a more robust backing and can be folded on itself to make a stiff "tool" for tight spots. It can be stuck to clay modeling tools for hard to reach places. It also lasts far longer. Diagram 3.

Tip: Cover your finger tips with adhesive tape to protect them when you sand. Be sure to remove finger rings.

Rifflers

For final shaping I rely a lot on my Italian riffler rasps in a range of sizes. See picture 1. Those sold for wood have way too much curve and they hang up on the push stroke, making them useless.

I found good rifflers sold for ***stone*** carving. See picture 2 for rifflers with a good bend. To replace my ancient tools I bought a set of Italian Milani steel rifflers from *southern-stone.co.uk.* I got the 200mm six-piece set but found them a little too coarse. I subsequently purchased the 150 mm set, which have slightly finer teeth. The only drawback is they are shorter and the opposite end sticks into my palm. Covering my hand with adhesive tape solved this. Their #660 is a nice knife edge

tool that is good for piping. Curved Corradi wood tools have too much bend but they do have a good, flat knife riffler.

A tool that Southern Stone did not have was one with a rectangular flat face. *The Complete Sculptor* has a Milani Steel Riffler # 37190 that is about 7¼ inches long. Their #37660 and #37667 are also good in the 7" size. I suggest you order a tool from each supplier to determine what will suit you, then order more shapes. Most come in different lengths, longer ones are coarser.

In addition to large riffler rasps I have a few tiny ones, equivalent to 100 grit sand paper. I use them extensively on details. These little guys are almost impossible to find but *2 Sculpt* has them, #'s B4 and B5. They are Milanis, the best rifflers on the market and well worth the price.

Note: Never use rasps on Bondo, it quickly dulls them.

Tip: A plastic tray for organizing dining flatware is great for storing rifflers.

`Chisels and Gouges

For basswood I like my Swiss Made gouges and chisels. The edges hold up well and the hexagonal handles keep them from rolling. One back-bent gouge is needed for getting inside the mouth.

A firmer gouge (bevel on the inside) makes the pole and tail holes. Old firmers can often be found fairly cheap at flea markets.

For bulk roughing-out I rely on a 1½ inch Stanley carpenter's chisel, my "whopper chopper". The tang ***goes all the way through*** the handle so it can be hit hard. The wood handles on carving tools will split. Shop around for a beach wood mallet. They can cost three times more in upscale catalogs.

I also have chip carving knives and a heavy X-acto knife. X-actos are not comfortable to hold and the blades can flex but they have their uses in tight spots. As well as these I use a teensy set of tools made for cutting linoleum block prints. Their edges are pretty flimsy but are good if used gently. Picture 3.

Sawhorses

A carving bench with bench dogs and a wooden vise at the end is indispensable. For working on the torso it can be too high though so I had a set of sturdy sawhorses made 22 inches high. (Perfect for a 5'1" sculptor!) The tops are 5/4" thick, 11" wide and 36" long. Legs are a full inch thick and 5 ¾" wide.

A hole can be drilled in the top of one, straight down through plywood attached to the stretchers below to accept a temporary pipe. This is very handy for holding the animal upright during priming and painting. Picture 4. When making a set of sawhorses keep in mind the torso will add several inches to the work level.

Calipers

I found some huge calipers online. They're intended for turning bowls but are good for determining the thickness of wood in the torso as you carve. (The cap of the torso is not glued on until most of the carving is done.) Picture 5. Smaller calipers are needed for measuring widths in the head and legs.

Glass Eyes

Although horse eyes are similar to deer eyes they have no blue tint. Van Dyke's Taxidermy Supply provides carousel eyes, measured in millimeters. It is wise to buy at least two sets in case one gets damaged during installation. Picture 6.

Clamps

Bar clamps have throats that get farther in when laminating (face gluing) panels. Pipe clamps have no throat and won't twist when you move a wet assemblage, ***which loosens*** the grip of 'C' and bar clamps. Strap clamps are weaker but are often the only option for legs and neck-to-torso joints.

Hand screw clamps are especially good for keeping the ends of boards aligned when building panels. (Use wax paper underneath). They also accommodate the step-in on some pieces.

For little jobs electrical tape is handy but it will creep on steeply angled surfaces when you're not looking. It should be anchored with small nails. Picture 7.

Drilling Jig and Dowels

A drilling jig attaches to a regular hand drill and has a sole and two rods that hold the drill at exactly right angles to the surface it is placed on. Because many pieces of a carousel animal are too large for a drill press this is the only way to make hidden dowel holes across seems. If the holes in the two halves of a seam are not perpendicular to the surface the dowel will flex the surfaces apart. You can see a jig in chapter 6, picture 2.

Long dowels from hardware stores are far from standard in diameter. If you plan to use them take a scrap of wood with a hole in it to test the fit. These dowels must have a channel cut down one edge so glue isn't trapped in the hole. ***Trapped glue absolutely will keep pieces from coming together***. Cabinet grade dowels, purchased in packages, have consistent diameters and spiral grooves to allow glue to escape. Picture 8.

Planes and Straight Edges

I have 14", 18", and 22" planes. You will also need two-foot and four-foot aluminum rulers for straight edges.

Steel Card Scrapers

Although traditionally used in preparing fine furniture these are very useful for scratching dried glue out of corners and removing the worst of riffler marks on flat surfaces. The edges need to be periodically redone to make a mushroom cross-section. They are held at an angle and can be used with a draw or a pull stroke. Pictures 9 and 10.

Stones and Strops (and a few notes on sharpening)

Natural stones eventually gutter, particularly the coarser ones. I suggest a coarse diamond stone with a completely coated surface for initial sharpening. A medium grit oil stone and a surgical black oil stone complete my flat set. I also have small, very fine surgical oil stones with rounded edges for getting the burr off the inside of gouges.

To get the most use from new natural stones I put a mark at one end, close to one of the faces, with enamel paint (the tiny bottles used for scale models). I reserve

this face for my hand planes so I always have one flat surface. New stones should be soaked about three days on each side in sharpening oil before use. The oil prevents metal from the tools glazing the surface. Use a small tray with a couple of toothpicks in the bottom to lift the stone to soak each underside. After each sharpening session wipe the stone clean and apply fresh oil. Diamond stones clean with water and don't need soaking.

There will be a tiny burr left after using stones. (This burr can be minimized by using a light touch.) On gouges use ***only super-fine*** rounded stones on the inside to remove the burr. ***Never*** use coarse stones inside gouges! Keep the stone flat against the shank to prevent rounding the inside edge. Get the last of the wiry edge off by slipping the tool sideways through a clean scrap of hardwood. Use a closed-pore wood like cherry that is less likely to hold contaminants. See diagram 4 and pictures 11 and 12.

The burr inside tiny veiners is cleaned with immaculate, 1500-grit sand paper folded on itself. Keep the sandpaper flat against the shank of the tool. A toothpick can be used to gently pull off any thin remaining wire-edge. Then it's on to a strop.

My strop is two inches wide and 16 inches long, the girth from a side saddle. The leather must be **smooth** and **hard** to avoid microscopically rounding the outside of the tool edge. Rounding makes the tool "skitter" off the wood at shallow angles. Look for a suitable belt at a thrift store.

When stropping keep the tool handles parallel to the strop. Running sideways as you would on a stone will cut the leather. Rotate gouges as you go, being careful to keep the angle the same through the stroke.

Stropping gouges (about twenty licks) is more efficient if the leather is charged with an abrasive. I use the finest polishing powder available for jade. To make it stick the traditional agent was Russian tallow. This is just lamb fat that has been melted and strained through cheese cloth. I learned about this from an old timer over 50 years ago. I suppose there are other alternatives now. The light coat I put on my strop has never gone rancid or needed replacement but the powder will need to be reapplied periodically. Keep the strop and polishing compound clean of contaminates.

Power tools

I like my Dremel tool. The flexible shaft Foredom is a bit clumsy and needs periodic lubrication. Cutting bits can chatter around in tight spots but with a little practice you will find out what they can and cannot do. Chatter can be minimized by pushing the bit as far into the collet as possible. Tiny drum sanding attachments don't chatter and are very handy.

I have a large detail sander with a triangular head that is helpful on positive shapes. Two-handled belt sanders are okay for hogging off bulk but will invariably round the edges of flat surfaces, ruining them for laminations. Final flattening should be done with hand planes. Another good tool when wasting large amounts of wood is a five-inch flexible sanding disc attachment for an electric drill.

All sanders leave nearly invisible flat spots. Find them by running your palm over the surface. Then use fine rifflers to knock down high spots, followed by hand sanding.

The Lancelot Bit

This little dream (or nightmare) is a four inch diameter chain saw belt that fits onto an angle grinder. It is terrific for taking off lots of wood quickly. It is also one of the most dangerous tools you'll ever use. Unlike a chainsaw, when you drop this baby it keeps on running. I jokingly tell people if I dropped mine it would run across the shop floor, chew through the wall, and continue towards my neighbor's garage until it ran out of cord! It would be safer if used with a "dead man's switch", a foot petal that must be depressed to run.

For an extra thrill sawdust can clog up the rocker switch, preventing you from shutting it off. You will need to periodically unplug it and clean it out. I always have the cord where I can quickly unplug it in case the tool gets jammed in the "on" position. The air intake must also be kept clean.

Lighting

Natural light should be supplemented by a source you can move around. I have an adjustable-height floor stand with a cross bar that swivels. Two LED lights can be pointed at the sculpture or bounced off the ceiling. I often make my final assessment after dark, using artificial lights only.

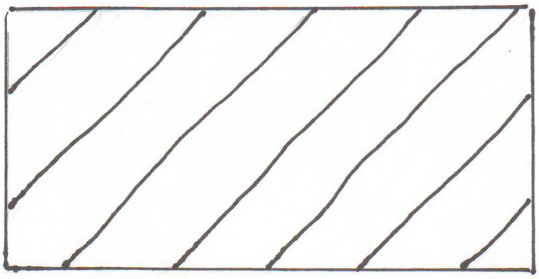
The Support Pole

The support pole is black plumber's pipe. Pipe dimensions are covered in chapter one. I get a 5 foot pipe that comes with threaded ends. Buy a flange and keep it on one end to protect the threads. The top of the pipe will get trimmed to length later. I make rolling display stands and the pipe flange is bolted to these. The bolts go through the flange and ¾ inch plywood for standers, 1½ inches of plywood for jumpers. When you buy the flange get four bolts and nuts. Pick up the washers at the same time and place them under the flange, aligning the holes, to be sure they aren't so large they overlap.

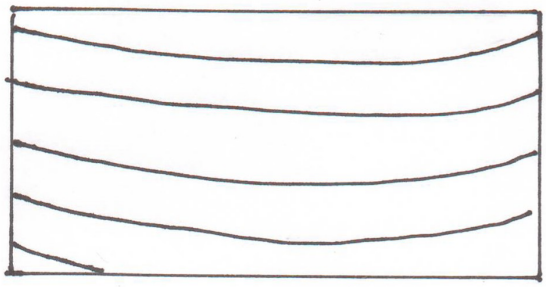
Since this long pipe is heavy and awkward to handle I also have a three foot piece. It comes in very handy when cutting and testing the pole holes.

Chapter 3, dia. 1

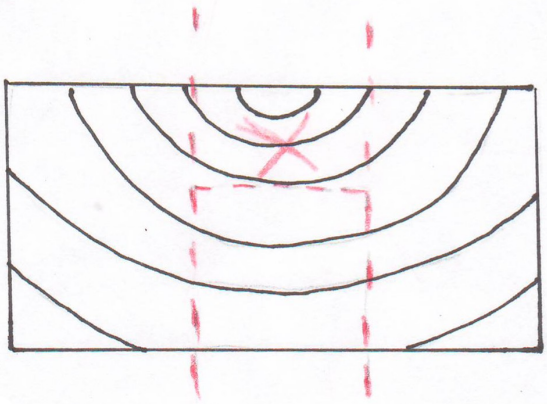
Board Classification



quarter sawn



flat sawn

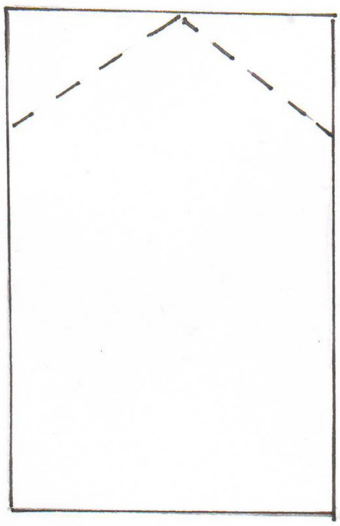


rip out the center of this board, toss the part with the red "X"

a small piece in the middle can be used

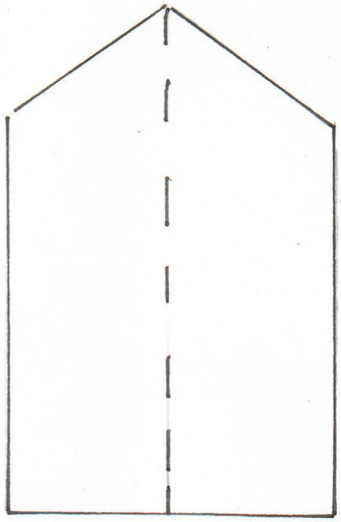
Chapter 3, dia. 3

Using Peel and Stick Sandpaper as a Shaping Tool

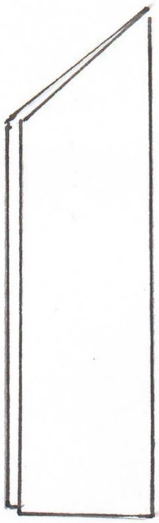


mark paper

cut with box knife, never scissors



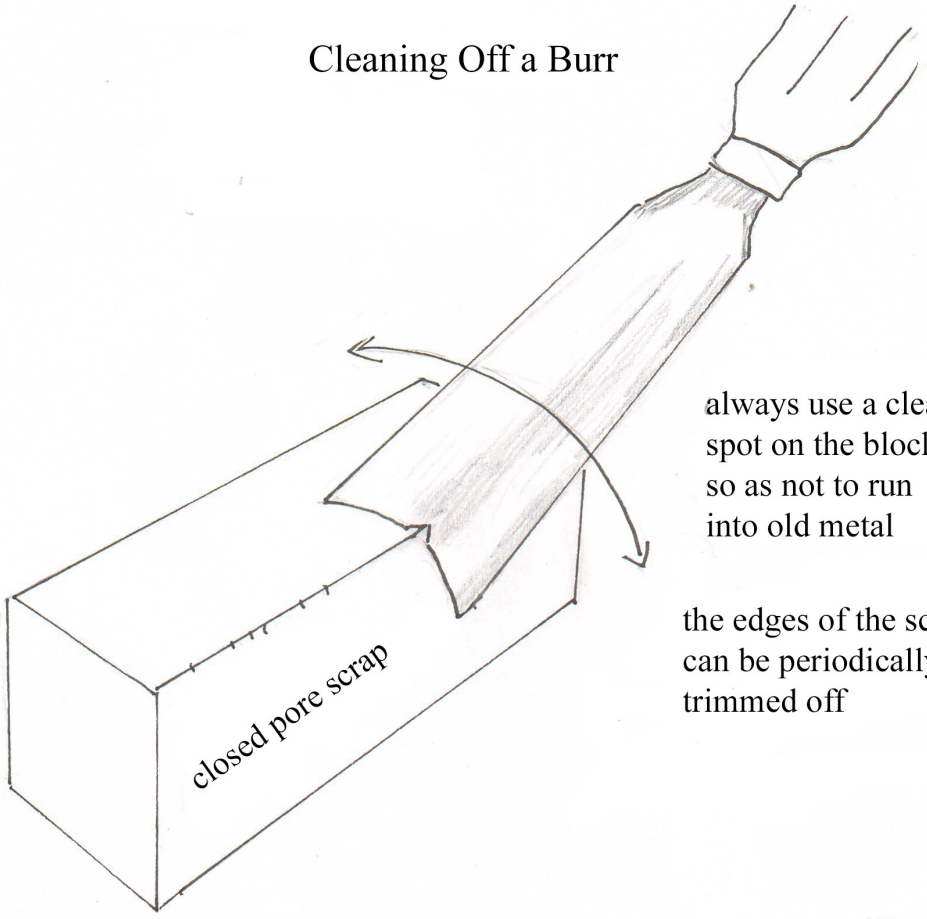
remove backing and fold along center line



the resulting piece is stiff enough for hard-to-reach places

Chapter 3, dia. 4

Cleaning Off a Burr



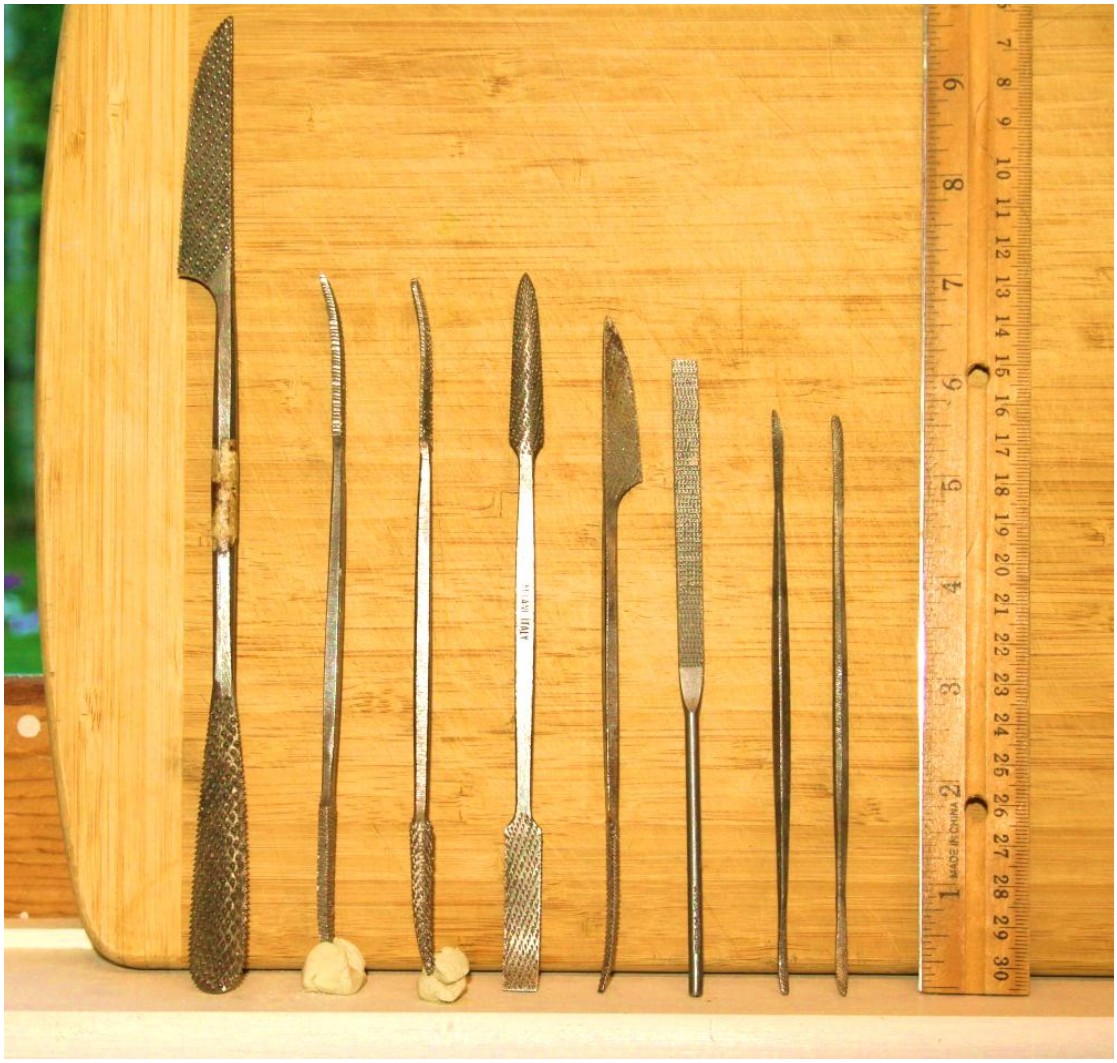
always use a clean spot on the block so as not to run into old metal

the edges of the scrap can be periodically trimmed off

Chapter 3, picture 1

Rifflers.

Notice how shallow the bend is. Rifflers should have teeth on the edges as well as the faces. The tiny tools on the right are great to even up piping. They have both rounded and flat faces.



Chapter 3, picture 2 My 40- year- old worn out tools

This is as much bend as rifflers need. These are 7 ¼ inches long. Wood working rifflers available **now** have way too much curve and hang up on the push stroke. I found much better ones sold for working ***in stone.***

Chapter 3, picture 3

Linoleum block carving tools.

These are good for tight spaces, especially around the eyes, but they are fragile. Cleaning inside radiuses requires 1,500 grit sandpaper.

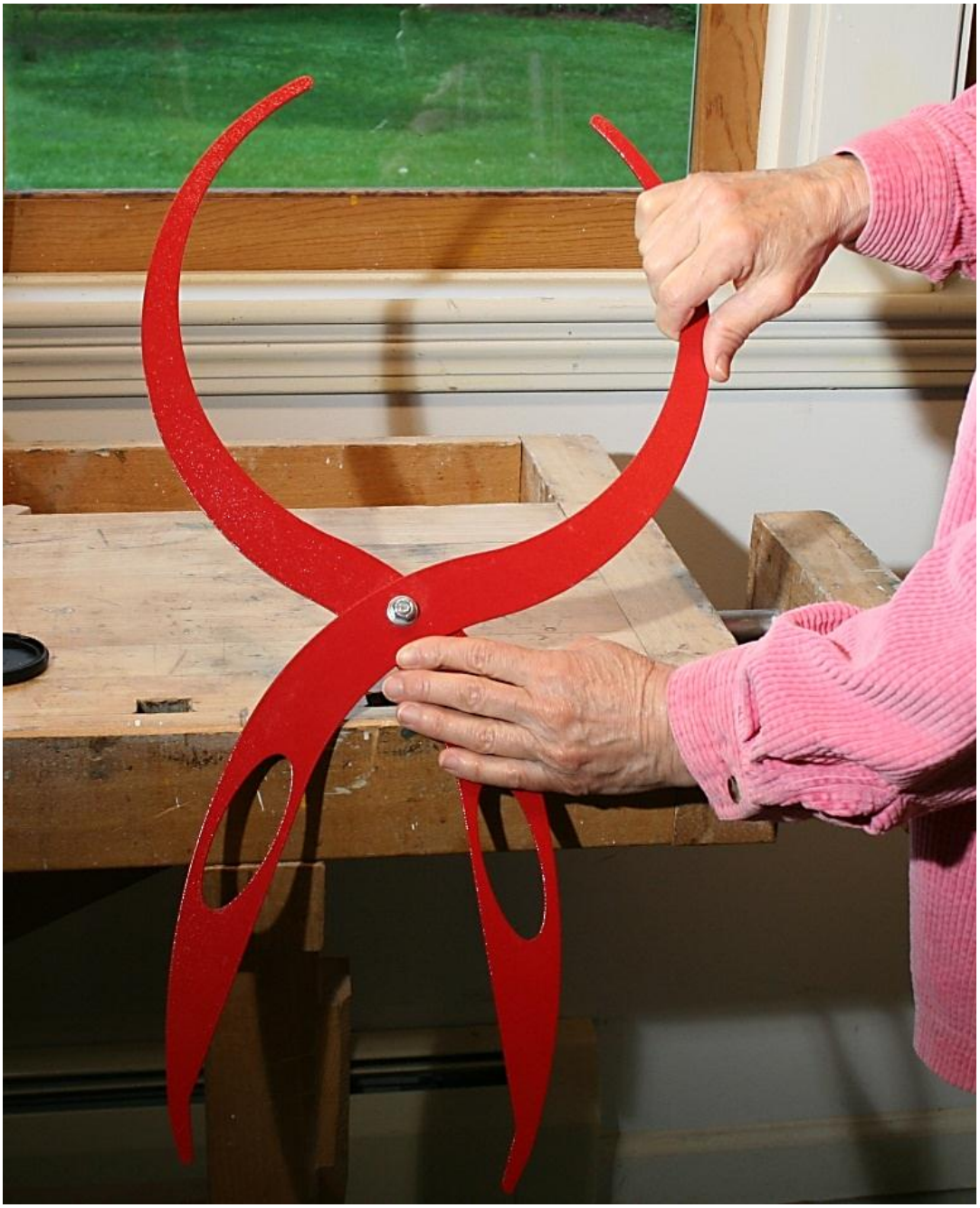
Chapter 3, picture 4

Sawhorses (the left side of Rose).

Tops are 11” X 36” and 5/4” inches thick. The legs are an inch think and 5 ¾” wide. The extra-wide tops create a valuable stable platform. The far sawhorse has plywood across the stretchers. A hole drilled through the sawhorse top and the plywood below can accommodate a pipe to hold the torso upright if needed.

Chapter 3, picture 5

Over-sized calipers, used primarily for turning bowls, are good for testing the thickness of torso wood. Available online.



Chapter 3, picture 6

A glass eye, dopping wax, and dowel.

Chapter 3, picture 7

Combinations of force were needed on this broken ear. The pupil orientation is a bit exaggerated on this guy but it should not be parallel with the corners of the eye. This early eye was later replaced with a nicer one. Note how muddy basswood turns when stained, (something the consigner did.) This later became Rose!

Chapter 3, picture 8

The spiral grooves on cabinet grade dowels allow glue to squeeze out.

Chapter 3, picture 9

Putting an edge on a card scraper, step one.

Use a metal file to create a fresh, flat edge. Looking from a shallow angle with correct lighting you can see when the old edge is gone and the surface is flat. If this was being used to prepare hardwoods for finish the file marks would next be removed on sharpening stones. It isn't necessary here.

P

Chapter 3, picture 10

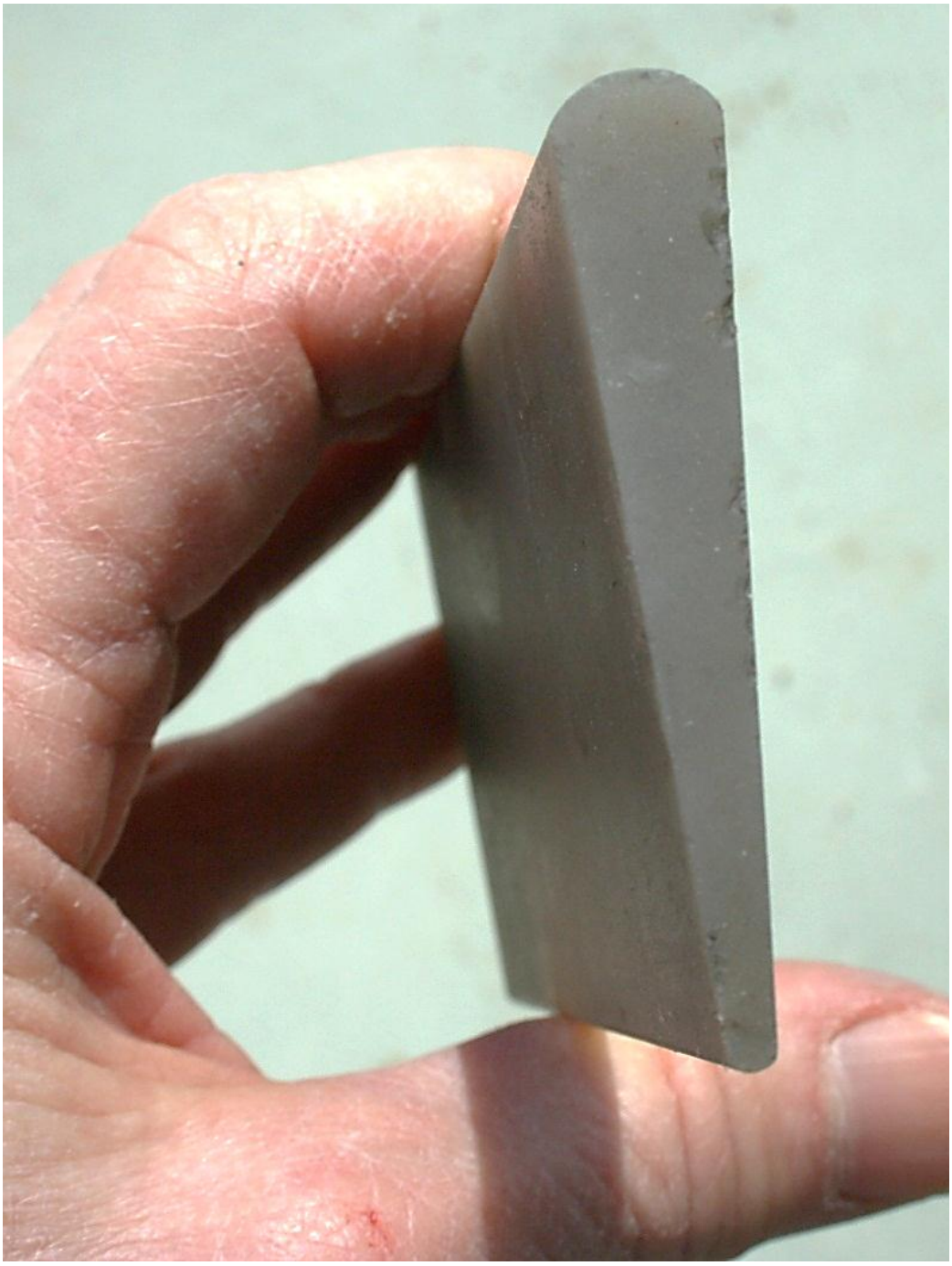
Putting an edge on a scraper, step two.

Any metal rod can be used. Run it several times at about a 20 degree angle, first along one side, then the other. A fair amount of pressure is needed. In cross section the edge will be mushroomed. Test it by carefully by pulling up on it with your thumb. *It will be sharp!*

A wooden vise prevents damaging edges already done.

Chapter 3, picture 11

Only use very fine surgical honing stones on the inside of gouges.



Chapter 3, picture 12

Honing the inside of a gouge.

Keep the side of the stone against the shank. Do not round the inner surface. I'm pushing the stone gently away from me.

CHAPTER 4

HEAD AND NECK

Head Position

I have put this chapter here because you may make just a head and neck. Usually the torso is built first when the full inventory of boards is available. When doing just a head and neck I cut the lower neck at an angle from withers to chest. If you are making an entire horse this seam would be horizontal and the lower part of the neck made from the torso blank.

I **pull** the head as though tugging on one rein. A pulled head rotates either to the right or left on a spot between the ears at the ***center*** of the neck blank. The neck as seen from the rear bends only near the top. See pictures 1 and 2 of a Muller horse that I restored. This animal is also on page 61 in "Painted Ponies" by Bill Manns.

I also like to **tilt** the head so the ear and nostril is higher on the left side. The upper neck has a slanted surface, with longer wood on the left than the full sized drawing indicates. Some wood on the right side is cut down. An angle of seven degrees is pleasant. This is covered in pattern making in chapter 2. Tilted heads are placed about an inch ***to the right*** of center of the neck. It may be necessary to laminate another piece of wood to the right side of the neck. Diagram 1. (Rose has a right tilt with a rein pull to the left).

Once the head and upper neck seams are flattened mark a registration line across them ***before any carving.*** Then preserve their location by extending them across the faces of the seams since the sides get cut off during carving.

Building the Head Blank

For the head I need only one paper template with details copied to both sides by placing it on a window.

To maintain symmetry when carving a head you must have a central line on the blank. Building the blank with a central seam, or a central board, avoids having to continually redraw a line in pencil. Boards laminated on each side should have the same thickness as each other. This way the lines where carved surfaces intersect the seams are useful guides when shaping the sides. Diagram 3.

Carving is easier if the wood grain is laid out at a slight angle to the long axis of the head. It makes it possible to do most of the face work in one direction. This is a real time saver and the slight angle will not significantly affect having surface grain at the seam. Determine the best layout by placing the paper template on a board and pantomime yourself carving the piece.

Gluing the Head Blank

An important point about gluing: You must apply glue to both surfaces and let it soak in for about two minutes. If you do not wait the seam will end up dry and weak. While spreading the glue recheck for spots where it may initially be repelled. Basswood will sometimes do this.

Note: When laminating large pieces begin clamping in the center, followed by the edge clamps. This allows excess glue in the center to flow outward.

Forward facing ears will extend above the forelock. Additional wood needs to be glued with the grain going vertically or the tips will break. Draw the forelock correctly on your paper template but cut the blank in a straight line a little above it. When building the blank flatten this surface with a plane before any carving. (How to test flatness is mentioned below.) If you make the ear seams below the forelock you will have a hard time flattening them to add wood.

With the head glued up flatten the seam with the neck before doing any carving so you can make it square to the sides of the blank. This is important. Test flatness with a piece of cabinet grade plywood that is large enough to cover the entire surface. Coat it with carpenter's line-chalk. (Don't use blackboard chalk. It has a wax binder that is difficult to remove.) Coat the plywood as evenly as possible using finger tips and puffing off loose material.

Carefully place the coated plywood on the seam and give it a little shift, then check for chalk transfer. With fine files and a sanding block fine-tune the surface. Never use a belt sander, it will round the edges. Recoat the plywood between each placement. Once it transfers evenly remove as much chalk as possible with a card scrapper and a block of wood covered with fine sandpaper. (It will not come completely clean.)

Use a combination square to run the registration line on the side across the seam to the other side of the head. I sometimes run an additional line behind the ears. Use these lines to correctly place the head template on the other side of the blank.

If the mouth is open drill a small hole straight through, just in front of the bit. This provides another reference for orienting the template on the other side. To keep the hole perpendicular use a drill press or a dowel drilling jig. (The jig is described in chapter six.) If the mouth is closed double-check the template position by seeing if the lip goes straight across the front.

Even if you are going to put in glass eyes carve them with a wooden eyeball first. This helps to properly shape the lids. For a peek-a-boo mane, where the forelock drapes over the eye, it is easier to add wood to the side after the eye is carved, with or without a glass eye. Before carving, outline areas where forelock wood will be laminated later. Make an "X" there as a reminder to leave it flat. See diagram 5.

Mark the center of the eyeball on the paper. Press an awl through this into the blank. Drill a small hole **straight** in there, at least an inch deep. This must be done while the sides are still flat. The hole is for reference to keep the eye from shifting position as carving progresses. With the template placed on the opposite side repeat this. Fill the drilled holes later or excavate for glass eyes.

Forward ears are easily broken off so add them after most of the carving is done.

Tip: It is easier to carve the forelock before adding ear wood.

Circles are drawn on the head blank where the ear additions will go as a reminder not to carve there. (To determine the exact final placement of ears you have to first carve the lower part of each ear on the side of the head.)

Be sure the ear seams are good since a lot of the contact area will be lost when hollowing the ear. On diagram five I had limited board height for the head blank so I planed the top flat and laminated another board that was thick enough to extend above the forelock. This automatically made nice, flat ear surfaces.

Expect some slippage during ear glue-up so cut the pieces larger than necessary. Gluing the wood involves end grain. For strength use Titebond Original glue here. Thin it about 20%, to pea soup consistency and let it soak into the end grain. Re-

apply until it will take no more. Scrape off the gummy residue and apply glue full strength to both surfaces, wait two minutes, and clamp.

Electrician's tape works well for small pieces when a good clamp seat isn't available. Be careful to apply equal pull as you wrap. The tape can hide an unevenly snugged seam. With your hand apply a little sideways pressure each way and see if more glue is squeezing out in one direction. Additional wraps of tape may be needed to correct the pull. Tape likes to slide when you are not looking so driving a small nail through the layers is advisable.

Carving the Head

Before carving, while you have a large surface for the doweling jig, make two holes at the neck seam about an inch deep for hidden dowels. They will keep pieces aligned during glue up. The jig and process for installing hidden dowels is covered in chapter six. Plan the holes carefully so they won't end up showing later either in the head or the neck.

To hold the head blank for carving screw a scrap block on the neck seam wood. Make the sides of the block close to the same size or you'll spend a lot of time turning the vise handle as you reposition the head during carving. The scrap should not be so long it touches the vise hardware underneath.

The profile can be cut out on a band saw before carving. As carving proceeds repeatedly lay the template on the wood and redraw the trappings as the lines get cut away. I determine head widths using a good model and ratio. Breyer horses are so small that any inaccuracies get greatly magnified in the enlarging. Finding a larger model to work from is better. I usually make my own clay model with a head about 4 inches long. See one in picture 4. I also found a very nice ceramic head that is about 6 inches long. I think it is supposed to be for dry flower arrangements. Keep an eye out at thrift stores.

Tip: When carving I leave the widest part of the blank, where the bridle roundels are, completely untouched until the end. This provides a useful surface to check the depth of carving on each side. The head (without trappings) is widest at the eye orbit, followed closely by the outermost edges of the ears. Pictures five, six, and seven show the progress on one head. In this head the grain in the ears was good enough not to need a separate piece of wood but they had to be handled carefully.

Straps: Carver's chisels, which have a bevel on both faces, tend to undercut as carving proceeds downward on straps. Rough out the straps wide, then final trim the width as a last step. You don't have undercutting with carpenter's chisels when using the flat surface against the strap line but you are limited to straight sections.

Mouth: Horses have a gap in their teeth where the bit rests. Only the front ones show, eight above and eight below. Unlike humans the grooves between the teeth come off the gums at an angle as shown in diagram 4 in chapter one. The grooves demarking the teeth would line up from upper to lower jaw if it was closed. The upper lip is more muscular and sticks out farther in profile. The lips turn down at the corners, even without a bit. (Chapter one, diagram 5).

Use a back bent gouge for the mouth roof. Don't bother to delineate the teeth from the gums inside but the tongue and bit are always carved.

Face veins: Face veins add a lot of interest but it takes care to keep them symmetric when viewed ***from the front as well as the side***. They are incorporated only after the face is sanded to 80-grit. Draw them on in pencil and lower the area around them a tiny amount using a veiner, small files, and sandpaper. Keep the veins shallow or your horse will look skinned.

Nostrils and Ears: The outside of both nostrils and both ears must be completely carved before hollowing them out. Once hollowing begins you can't go back and make corrections.

Eyes: Eyes can be wood or glass. Van Dyke's Taxidermy supplies glass horse eyes in a range of sizes (in millimeters) with flat backs. Don't use deer eyes which have a bluish tint. It is easy to damage them during handling so order a few extra pairs. When positioning them the long axis of the oval pupil should be horizontal when the horse's head is "up", as if looking at something distant. This means the pupil doesn't quite line up with the corners of the eyes.

Carve the eye with a wooden eyeball. The front to back corners of the lids must be wider than the glass. Hollow out for the glass only after the eyes are completely filed and sanded since sandpaper easily scratches glass. (Scratches can be fixed with a coat of clear nail polish.)

Glass eyes are covered by both lids. Don't try making the lids with Bondo, they will break off. The upper lid covers more of the eye than the lower one. A Dremel tool works well to hollow out just enough inside the lower lid to seat the eye. To allow the eye to be positioned, extra space is hollowed under the upper lid and the eye socket is made deeper as shown in diagram 6.

Be careful when hollowing not to rest tools on the opposite lid as it could break. If the lids get lightly bruised they will recover by wetting the wood and covering with duct tape overnight.

Tip: Dampening and covering wood is also good for lifting dents from clamps. If you do not lift surface dents now they will lift later when primer is applied.

To handle the eye I use a 3/8" dowel and lapidary dopping wax. It can be cleaned off later with acetone. ***Don't get acetone on the eye's back or it will melt the paint.*** I first extend the pupil orientation on the glass eye with a black marker as it can be hard to see under the wax. I put the marks just at the edges since I am not sure how well wax sticks to it. Place the dowel slightly below center to keep it out of the way during positioning and don't apply too much wax.

Dry fit the eye using the extra space under the upper lid to clear the lower lid and pull it down into place. The eye will be more convex than the lid and will touch only near the center. If the wax pops off during dry fitting just reheat it and reapply. Picture 9a.

Tip: Heating the wax with an alcohol lamp will not leave soot like a candle. A propane kitchen stove burner works but the wax melts quickly and sheds drops. To minimize clean up put some aluminum foil down first. Avoid burning the wax.

To permanently seat the glass I use Bondo. Message the tube of catalyst first to homogenize the ingredients. In the can the resin usually separates from the filler. By not completely stirring it a more fluid mix can be made, putting less strain on the wax when seating the eye. The final mix isn't as strong but that's not an issue here.

Mix a few test batches on a piece of corrugated cardboard. (Pressboard has ingredients that inhibit curing). Keep track of how fast they set up. Over-catalyzing will cause it to harden faster. So will warmer temperatures so don't

leave the can near a heat source. Larger amounts cure faster because the reaction creates its own heat. The catalyst is colored so the hue of your best mix is a good indicator.

Use eye protection! Both acetone and catalyst can blind you. Make up enough to allow some to squish out. This will later be shaped to make the sclera and fill any gap between the glass and the eyelid. Picture 19b.

Things get a bit tricky if the dowel pops off during the positioning stage with Bondo. If it does, immediately fish the eye out with a tool that has a hook on it. (Have an appropriate one handy). The front of the eye can be wiped with acetone and a cotton swab but use only a dry rag to get the worst off the back. Clean out the socket using an old Dremel bit and try again. (Bondo dulls bits quickly). I had to do this on one particularly frustrating job three times. I should have used a thinner batch of Bondo.

Hold onto the dowel a few minutes until it starts to harden. Bondo can be shaped like clay if you work quickly. My tiny linoleum tools come in handy here. Once shaping is done clean the wax off with acetone and cover the eyes with masking tape to protect them. Picture 20.

Since it is possible you may need to remove a misplaced eye that has hardened I have included the steps here. I used Rose to demonstrate since prettier eyes were available when she was returned to my studio many years after I made the head.

Cut through the eye with a tube-shaped, diamond-coated drill bit made for ceramics. Diamonds are hard but easily burned so use a wet sponge to dribble water on the bit while cutting. (Water will soften the surrounding wood until it dries so be gentle.)

Have a helper with the sponge so you can hold the drill with both hands. The bit is easier to keep in position if you start at an angle and then rotate it to vertical. Drill all the way through. Use eye and hand protection as you break up the glass with a hammer and screwdriver, tiny shards go everywhere! Pictures 21 through 23.

Carving the Neck

As you did with the head, flatten both upper and lower neck seams and extend the registration marks across them before carving. (On a horse with a head tilt cut the

upper surface at a slant.) Drill two corresponding holes for the hidden dowels already in the head, about an inch deep, before carving. The technique for drilling holes is gone into detail in chapter 6. Drill two dowel holes at the bottom of the neck while you have the largest surface to seat the doweling jig. Keep in mind the sides of the neck will be cut in so be careful to place the holes where they won't end up showing.

Rose's head was already carved so I had to grip it between my legs, upside down with ears resting on the floor, to make the holes. It was awkward but not impossible.

Special Note: Always dry fit seams with hidden dowels and be sure they come ***together all the way***. Slightly misaligned holes won't show up until the pieces are completely snugged up. You can rasp off the side of one dowel to fix a slightly misplaced hole but mark it's orientation in pencil before removing it.

Screw a scrap block to the bottom of the neck for the vise. The bigger the block is the more screws you can put in but be careful the holes won't show after carving. I prefer to finish carve the head before gluing it to the neck blank. I then do as much of the neck as possible, leaving just the area where it attaches to the torso rough. Picture eight shows a head on a neck ready for carving.

Remember when carving flying manes to make the tendrils go in the same direction on both sides. The steps of a flame mane are shown in pictures nine through 13. Pictures 14 and 15 show a roached mane.

Placing a Slanted Neck on a Body

If you have made just a head and neck with a slanted lower seam and later decide to put it on a body the torso must be cut at an angle. I had this when retrofitting a body onto Hunter's head/neck. A piece of wood has to be face-glued between the two to avoid end-grain to end-grain gluing. The piece is incorporated in the pattern for the torso. See chapter one. The grain must run vertically, ***never*** side to side. (When retrofitting Rose the torso seam was close enough to face grain not to need this extra wood.)

Placing a Straight Lower Neck Seam On a Body

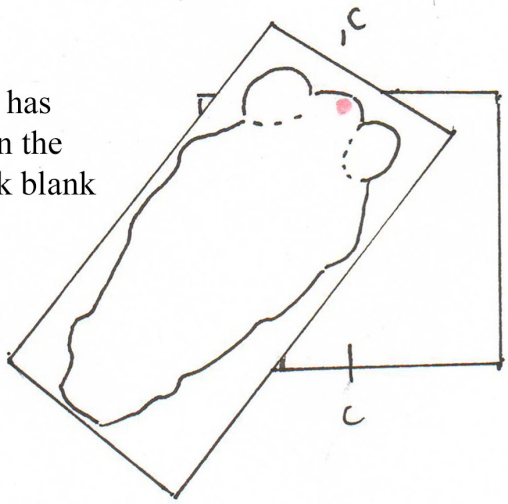
Grain in the neck can be horizontal or vertical. Vertical will be necessary for a flame maned horse. At the neck/torso joint end-grain to face-grain is not the strongest but with careful surface preparation and proper gluing protocol it will hold. Placing through dowels (whose ends show) across the seam later doesn't add strength so don't bother with them. Hidden dowels do get installed to keep pieces registered during glue up.

Note: You won't glue the neck to the torso until after the cap is glued. The cap is glued much later, after most of the trappings are carved and the legs are attached. However, hidden dowels must be put in now before any carving.

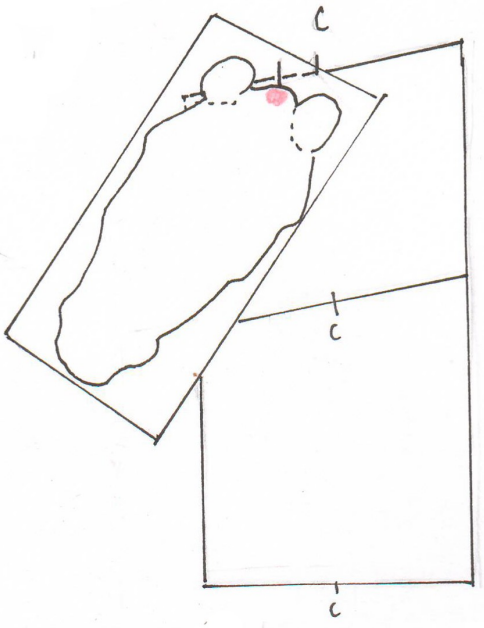
Chapter 4, dia. 1

Head Placement On Neck

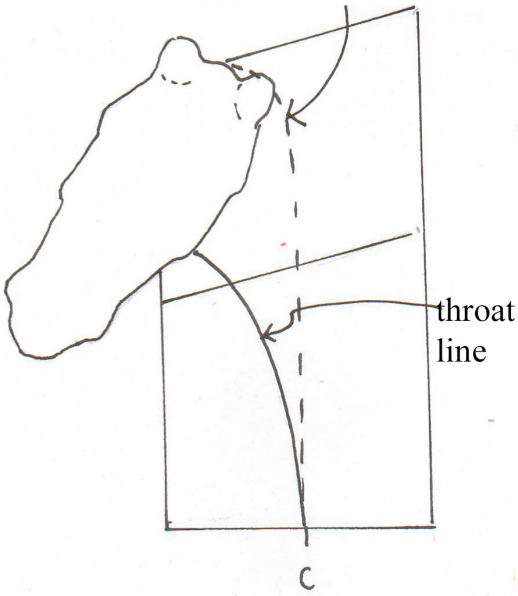
a simple rein pull has the poll staying on the center of the neck blank



a pull with a tilt requires about a seven degree angle cut on the neck and the poll moved right



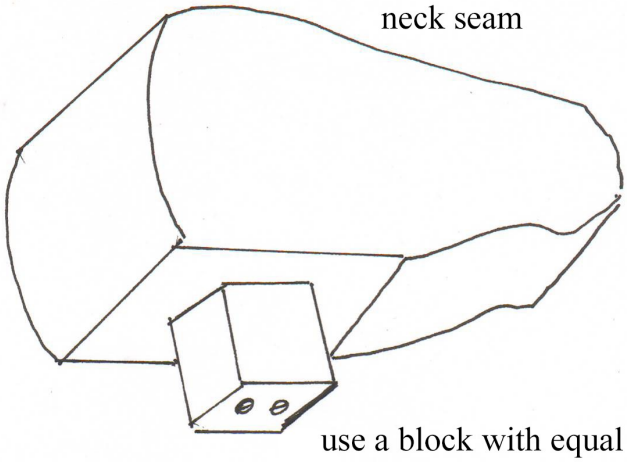
the topline of the neck is bent only near the poll



Chapter 4, dia. 2

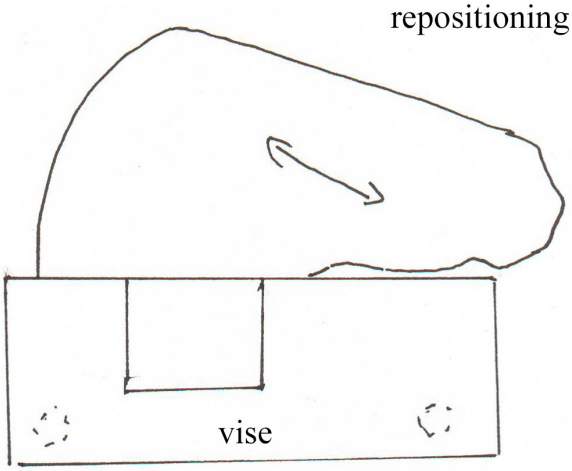
Attaching Mounting Block

attach a vise block to the head/
neck seam



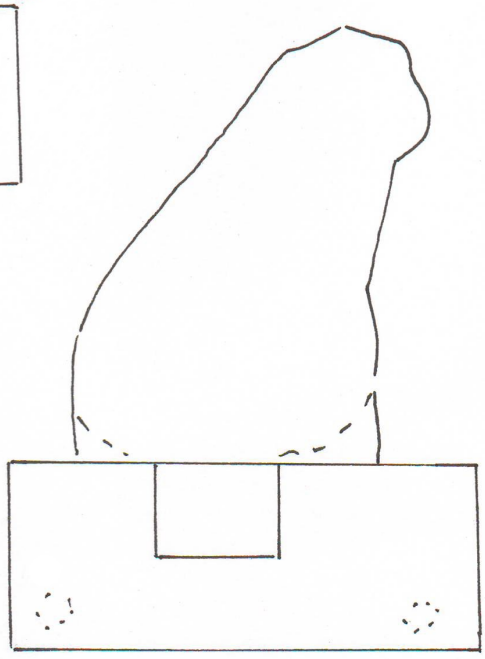
use a block with equal sides
to minimize vise adjustments when
repositioning the head during carving

this head/neck seam allows
for a more natural position
for carving



this head/neck seam puts the head
in a position that is harder to
carve

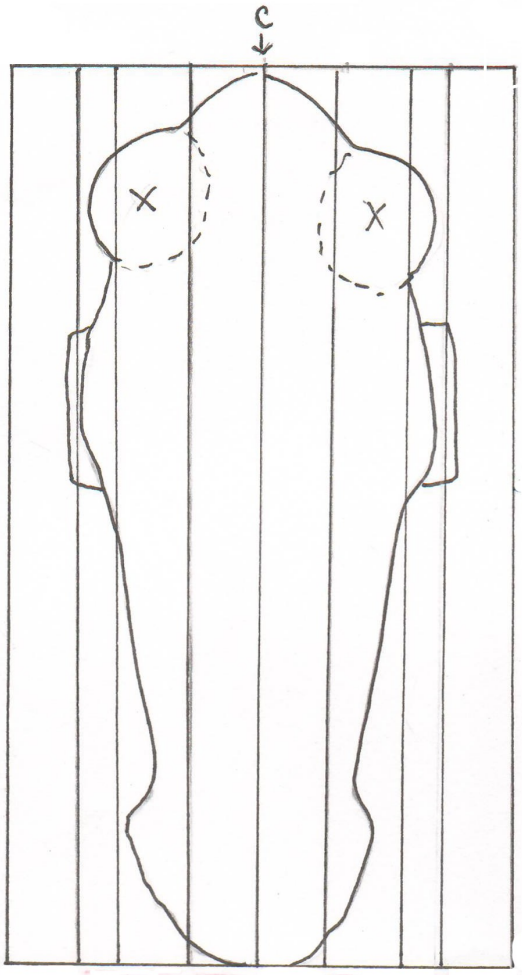
the vise tends to get in
the way and the shapes are
more difficult to see



Chapter 4, dia. 3

Top View of Head Blank

start with central seam, or central board, and make laminations the same size as each other as you add them on



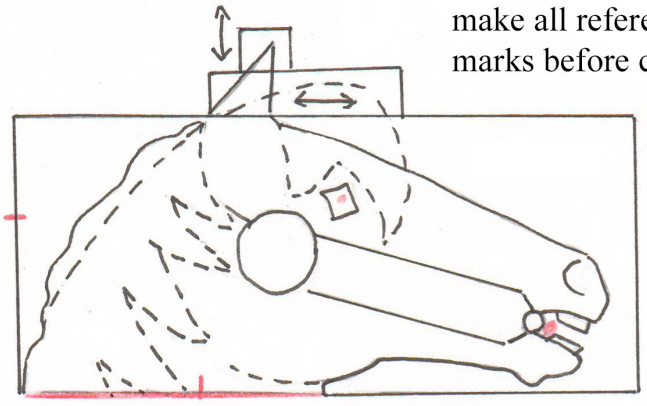
a b c d d c b a

WIDTHS

the rondels will be the widest part of the bridle, the bone over the eye orbits are the widest part of the face

Chapter 4, dia. 5

Transferring Pattern to Opposite Side

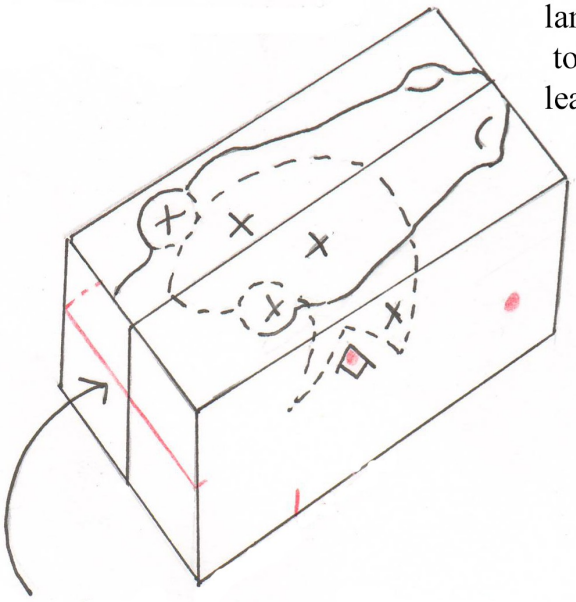


make all reference lines and marks before carving

drill small hole into eyeball

drill a hole all the way through the mouth just in front of bit

red pencil marks provide reference for placing template on second side



mark areas of future laminations with an "X" to remember to leave them uncarved

red dot marks the spot to drill right through, in front of the bit

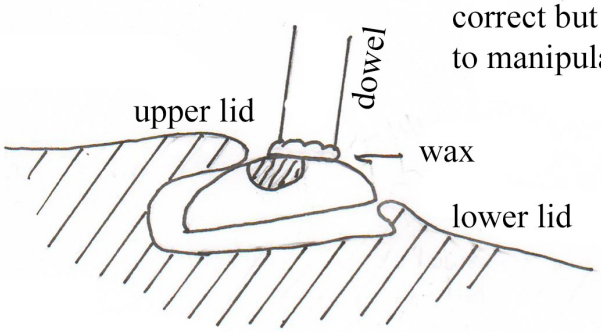
extend registration marks across back of blank and under the throat with a combination square

Chapter 4, dia 6

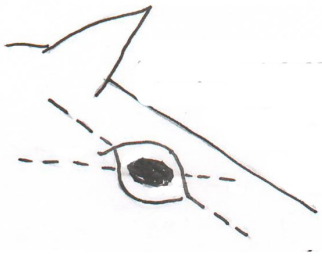
Cross Section of Eye Placement

carve a wooden eyeball first

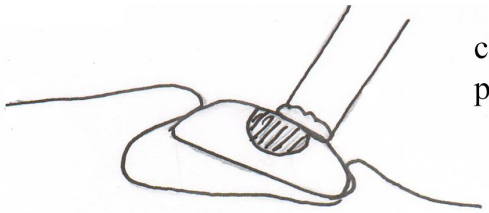
make the space under the lower lid correct but create extra room elsewhere to manipulate the eye



place dowel a bit below center of eye so it doesn't hit upper lid as you clear the lower one

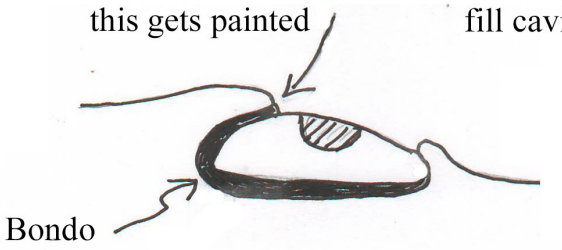


the pupil is not parallel to the corners of the lid



clear lower lid, slide eye down into place

with dry-fit test done, remove eye and fill cavity with a loose Bondo mix



shape excess Bondo while still soft, never use sandpaper

Chapter 4, pic. 1

This Muller stander has a rein pull to the right but no tilt. Poll of head is centered on the neck blank.

Chapter 4, pic. 2

Notice the neck on this Muller stander is not bent. The rein pull occurs at the seam with a little carving just in that area. The small missing piece of the mane was replaced later. This horse is seen on page 61 in Painted Ponies.

Chapter 4, picture 4

Clay maquette for Hunter.

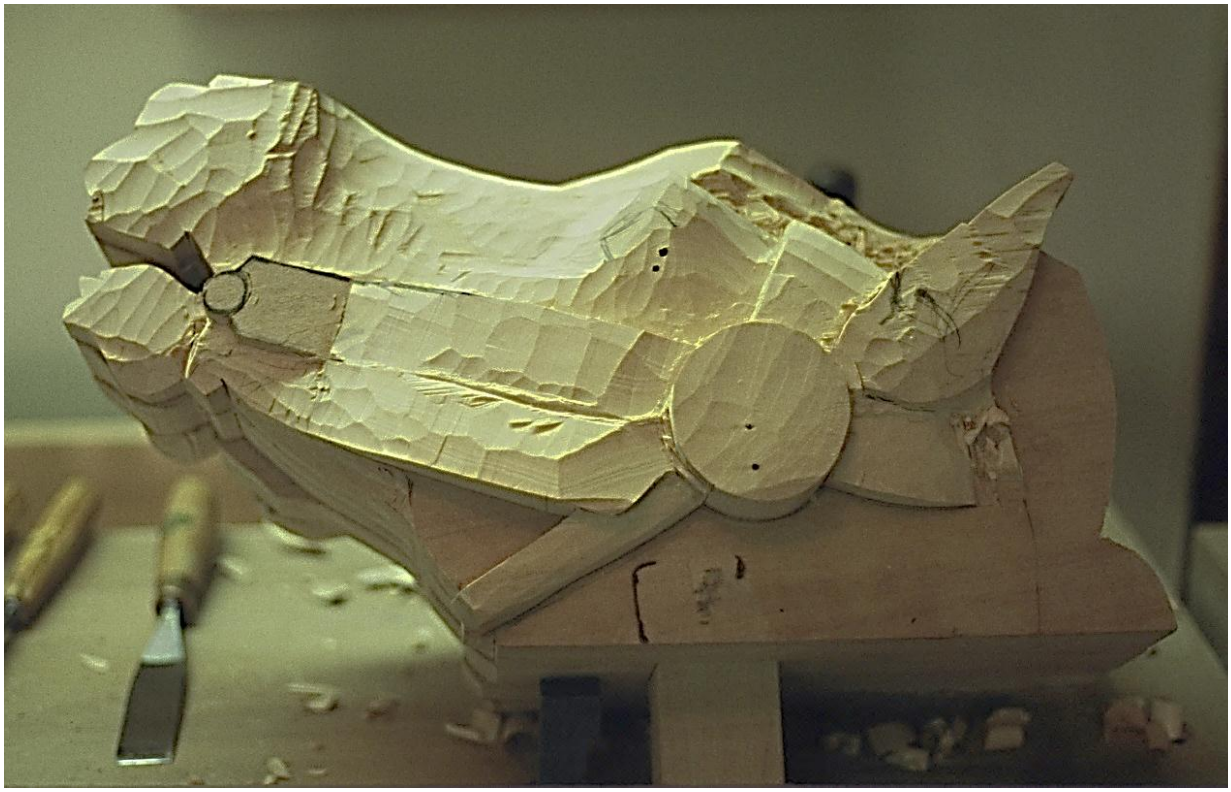
This model is about six inches high. At this scale no attempt is made to put on trappings. The head is always sculpted straight ahead. A fuller forelock is needed.

Chapter 4, picture 5

Head, (not Hunter), first roughing.

The first hole I drilled for the eye center was off so I redid it. On later horses I left the rondels untouched until the end to check the depth of carving on each side.

You can see on the ear how far from parallel the grain is to the long axis of the face. In this case the angle made it unnecessary to add ear wood. It is more common to have to add pieces with vertical grain.



Chapter 4, picture 6

Head, further carving.

The eye has been redrawn. The outside of both nostrils are fully shaped before going inside. The cheek strap is deep to allow for details and the fringe.

I designed a hole for a peg when making the head blank in this early commission. I thought it would be good for holding the head in a vise. On later horses I simply screwed on a scrap block underneath.

Chapter 4, picture 7

Fringe.

Each segment is carved with a flow inward or outward. To the right has been a little further done with veiners and rasps. Avoid sanding until the carving is done since imbedded sand dulls tools.

Chapter 4, picture 8

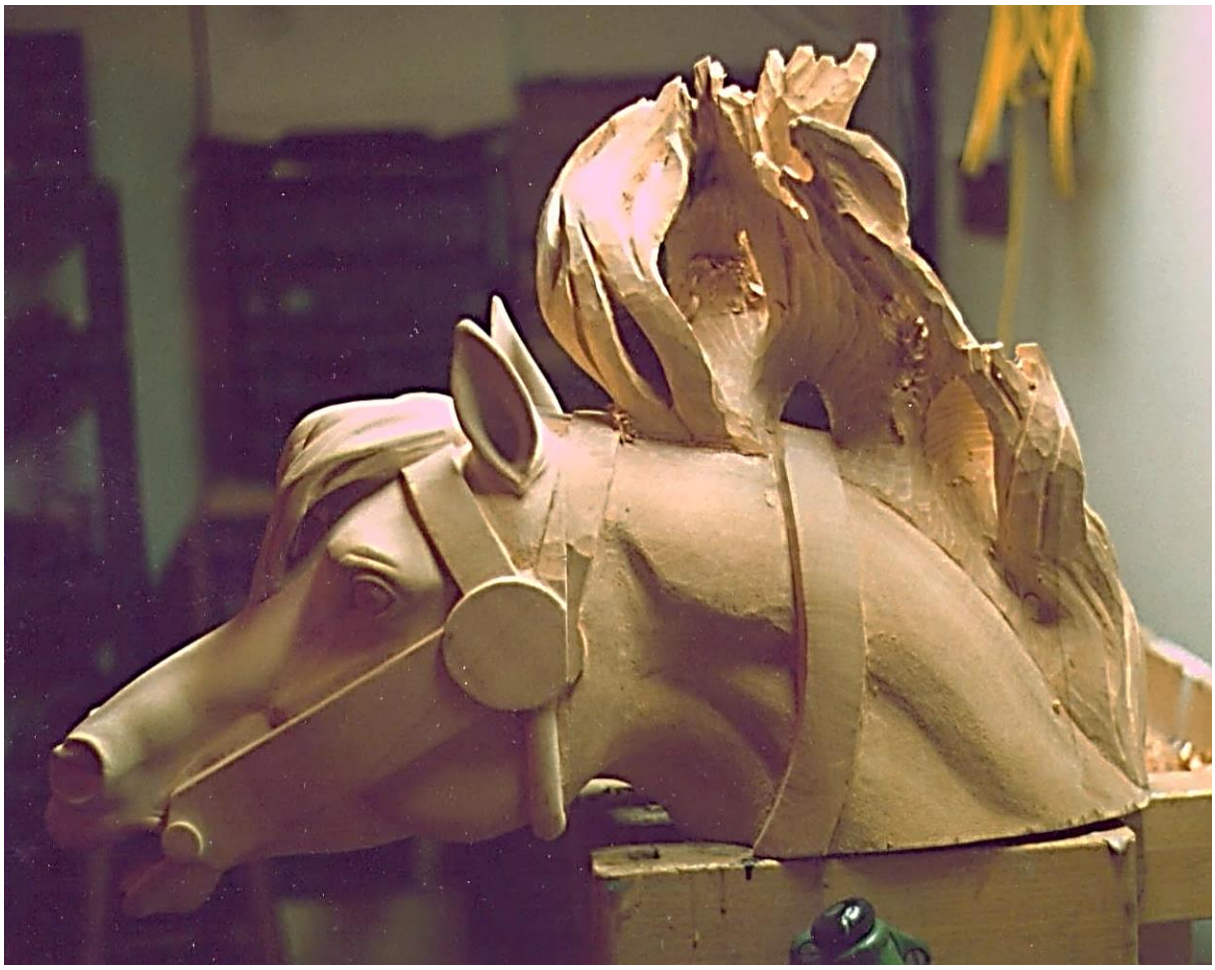
Head on un-carved neck.

Having the seam under the cheeks allowed the head to be held in a natural position for carving. This neck grain is vertical and the mane had to be designed to work with the change in grain direction.

Chapter 4, picture 9

A flame mane roughed out.

I made the head/neck seam vertical, just behind the ears, to keep the entire mane on vertical wood. You can see it on the rondel. The head had to be clamped at an upright angle during carving, a challenging position. A piece of wood will be added to finish the rondel and strap.



Chapter 4, picture 10

More on the flame mane.

Concave areas are hard to reach and left less detailed. Dremel tools and bent-back gouges were used. Keep grooves going in the same direction on both sides. A wrinkle of skin behind the ear adds a bit added realism.

Chapter 4, picture 11

Flame mane from the rear. A lot of work!

Chapter 4, picture 12

Flame mane, right side.

The eye is still wood. On later horses I left material for the forlock off the side until the glass eye was in, making access much easier.

Notice the grooves on the tassle fade to almost nothing where they approach the ring. Just a few were added for effect. I could have done the same with the bridle fringe to make the job easier.

Chapter 4, picture 13

The finished mane.

The mane has been smoothed with rifflers and sanded to 80- grit. Where possible the grooves faded to nothing at the connection to the neck, just like the big tassle.

Chapter 4, picture 14

Varying the depth and width of grooves on a roached mane provides interest. Feathering the gooves to flat near the neck saves a lot of work. The tendrils go in the same direction on both sides.

Chapter 4, picture 15

I used a small, deep gouge and no sanding to create this texture.

Chapter 4, picture 19a

Dry-fitting a glass eye. The socket has been cut out with more space under the upper lid so the eye will clear the lower one. It is hard to see in this photo but black marker has extended the pupil orientation on the glass. The dowel is a little below center to keep it out of the way as the eye is slid up under the upper lid. The consigner stained this head, you can see what a muddy look basswood gives.

Chapter 4, picture 19b

Holding a glass eye in Bondo.

Gloves are recommended. Extra Bondo in the eye hole has squished out. As it started to harden the dowel was snapped off and tiny linoleum block carving tools were used to shape the sclera.

Chapter 4, picture 20

Rose has a new eye.

I reshaped the lids a little. The glass will clean up with acetone. If it was scratched clear nail polish would make it look new. The filler will be painted. The pupil looks like it could have been angled more but that is the photograph. (The white stripe at the top is a reflection from my shop light.)

Chapter 4, picture 21

Replacing an old eye.

Duct tape protects the face from dings and some of the water needed to wet the glass-cutting bit.

The client decided to stain this head. The entire surface was later recarved to remove the stain and become the head for Rose.

Chapter 4, picture 22

Drilling out an old eye.

A dampened sponge is squeezed over a cylindrical, diamond-coated bit to keep it cool. I started the bit at an angle for better control, then rotated vertically and cut through to the bottom.

Chapter 4, picture 23

Chipping out the old eye.

The glass is broken out with a hammer and screw driver. Eye and hand protection are a must! I took my gloves off to take the photo. The finished eye is shown in photo 20.

CHAPTER 5

MAKING PANELS
BUILDING THE TORSO

Evaluating the boards

Most people will be making a whole horse. In this case the head and neck are begun after the longer boards for the cap, sides, and belly have been selected. Leave the boards at full length as they came from the mill. Allow them to lie on the floor on their edges, unrestricted, for at least six weeks. They have been kiln dried to a very low moisture content and must reach equilibrium with the shop environment. Expect some warping. There is no way to restrain 7/4" wood so let it reshape before beginning.

With the wood fully relaxed check it for bowing, cupping, twisting, knots, and end splitting. Slightly cupped boards are flattened by further planing. If possible plane most of these pieces to the same thickness even if you must take a bit more off some. It's convenient not to have a lot of random thicknesses. Severely cupped wood should be ripped down the length. If the rings are tightly curved make two rip cuts and toss the center piece.

Trim off split ends ***two inches farther in*** than the visible crack. Transfer the location of any defects on one side to the other in pencil. You will not be able to see defects on the underneath side when you lay the template on to select your boards. ***Never use felt pens***, the ink will bleed through your paint later.

Twisting in long boards can be determined by laying them on a bench and placing the shanks of long clamps across each end. I use bar or pipe clamps, first being sure there is no old glue on them. Lean down and view over the tops. Any twist will show up clearly. This may be limited to certain sections of long boards. Placing multiple pipes will indicate where you can cross-cut to make shorter, useable boards. Picture 1.

Bowed seven-quarter boards cannot be forced flat. Pick the straightest ones by sighting down one edge as you would a pool cue. Reserve the best pieces for the belly, cap, and side panels since they are the longest. When making panels (a panel consists of two or more edge-glued boards) don't try to force alignment with hidden dowels or biscuits. Even the best boards will have

slight discrepancies when made into a panel. It will be planed flat after it is glued up.

Making Panels

I use white Elmer's Glue-All. Titebond Original is stronger but harder and more prone to chipping carving tools. I use Titebond Original only in areas that need extra strength. All glue should be water soluble**.** ***Do <u>not</u> use glue that says "weather proof" or "for outdoor use".*** When it squeezes out of a joint and is cleaned off, even while still wet, it will have penetrated the area. This will permanently seal it, preventing gluing more wood there later.

Making the Belly and Cap Prior to Duplicating the Second Side

The belly and cap panels are the first to be made since you need to trace them on the first full-sized drawing before duplicating the second side. Since you don't know exactly where you will place them leave extra length on both.

The belly panel must have <u>even thickness</u>, <u>parallel sides</u>, and have <u>sides square to the faces</u>. If you don't do this correctly the rest of your project will be a nightmare. Use the most stable wood. Since quarter sawn pieces are generally narrow you may need to edge glue some boards. If the panels are too wide for machine planing flattening panels by hand is described below.

The width of the torso blank is the belly piece plus the two side panels. Make the belly so you end up with the horse's actual body plus an inch on each side for trappings. Very few trappings need more than an inch and extra wood can always be laminated for higher relief elements. Seven-quarter bass wood is ideal, even though a little thickness is lost when flattening the panels.

Note: The thickness of the two sides can't be accurately predicted until their panels are planed flat. A slight discrepancy is OK since there is quite a bit of fudge factor in the final width of the animal. Just make a note of the thickness of each side so you don't carve through later.

The cap panel lies ***on top*** of the sides and is left a little wide until after gluing to the torso. Once the cap and belly are made lay them on the drawing as described in chapter 2.

Making Side Panels

Trace the cap and belly on the first side as previously discussed. Their exact location, and registration marks to legs and cap, must be copied to the second side drawing. Label each leg and cut the side templates out. Remember to leave extra wood for strap sags and tail hole and do not cut along the inside dotted line on the belly panel. The cap gets separated so you now have working templates for the torso sides.

Selecting boards for the sides: With boards still as long as they came from the wood yard place boards snuggly, edge to edge, on the floor. Alternate the growth rings at the ends.

Put the fancy side torso pattern (right side), trappings up, over the boards. Diagram 3. (Trappings not shown in the diagram). Have at least half an inch of wood extending below and above the paper template. The wood below provides material for small nails to control slippage when gluing sides to belly. The extra wood above provides material if the individual boards need further joining to make the seams tight and square. It also allows for fine tuning the tops of the sides after they are glued into a torso blank.

Shift the boards forward and back to move defects to areas that won't require much detail. Now you understand why defects were marked on both sides of the wood. Trappings and outlines aren't transferred yet since anything drawn now will be lost during flattening. Temporarily pin or tape the template on so you can leave the boards long enough to allow a **straight** cut across both ends of the assembled panel, with an inch to spare at each end. (Side panels will be too wide for machine planing. Staggered ends would be impossible to flatten by hand.)

Number the boards and make reference marks across the seams. I use a "V" here to limit confusion with other marks. Trace a line in colored pencil, about five inches long, on the paper where one of the seams in the wood occurs. Using an awl pierce a registration point through the paper into the wood in a place that will get carved down or laminated over later. The line and pierce point provide reference marks to position the template after the

panel is flattened. The pierce point will also help keep track of which side of the panel faces outward. Cut the front and rear of each board along the straight line but leave the extra wood at the top and bottom.

Gluing up Side Panels

Place the bottom board in a bench vise, then dry stack the rest vertically. Align registration marks. Check for overall flatness with an aluminum ruler and look for gaps using backlighting. Picture 2a.

When gluing do not attempt to add more than one board at a time. Multiple pieces become a malevolent entity when slippery glue goes on! Leave the bottom board in the bench vise and put glue on ***both halves of the seam***. This ensures glue gets soaked into both pieces. I spread Elmer's Glue-All with disposable basswood wedges. I keep a box of these handy, in various lengths and angles. Picture 2b. They are made on a band saw as shown in picture 2c. Half the pieces fall out as they are cut. The rest come out by sawing off the bottom of the scrap. (Tape over the table slot keeps them from falling through).

While the glue is soaking in go over it a few times to even it and check for sneaky dry spots. Basswood can initially repel glue. Wait 2 minutes before clamping

Hand-screw or "C" clamps over scrap wood at the ends keeps the faces aligned. Include waxed paper so they don't get glued to the panel. Gluing a piece at a time, try to place long clamps on alternating sides of the panel to minimize distortion. (The bench vise will likely be in the way for some of this). Tighten and immediately recheck the flatness since clamps can pull the panel away from flat. Move the clamp feet closer to one face or the other to correct. **Watch your registration marks.** Small slippages on successive pieces can make the panel too short.

Note: Even the best boards will show slight deviation down their length. Don't try to force them to align with biscuits since you are likely to carve into them.

It is not necessary to apply mega forces with the clamps but check them after about a minute. As glue squeezes out the pressure may loosen. Scrape off excess glue while it is still wet with a scrap wedge. (The lifted glue can be

put back in the bottle but you may have to add a bit of water to it at some point.)

Shanks of bar or "C" clamps can swivel when you move your piece. ***This will loosen them!*** Leave everything undisturbed for 24 hours. Repeat the process until you get all the boards glued. Repeat the process for the second side. Be aware the five inch colored pencil line will not be at the same location since different boards are being used. On the top where it will not be trimmed off label each panel, right or left, and which is the front end.

Flattening the Panels

Secure the panel with bench dogs which hold without getting in the way. Use a triangular scraper with a long handle to remove blobs of dried glue. Avoid power sanders since they invariably round the edges.

I use 14", 18", and 22" planes to flatten the first face. Down each long side use a long aluminum ruler and hog off obvious high areas with a 14" plane. Proceed to make each of the long edges flat with longer planes. Next plane across the grain. Going in this direction produces frass rather than shavings. Puff it off between each pass so the sole of the plane stays on the wood. It is easy to round the edges. As you end each pass keep extra pressure on the back half of the plane.

Tip: If the hand plane is long enough you can tilt it on edge for a quick flatness guide in this direction.

With a long ruler check the straightness along the edges, ends, ***and then across the diagonals***. Ideally the ruler should be long enough to cover the entire surface. Checking diagonally is important because it is possible to have all four edges straight but still have a twist in surface. Try a playing card as an example. If two opposing corners are high plane them off until the straight edge touches all the way along, using backlighting. Then go back and rework the surface until both diagonals and all four edges are flat. If it looks like you may lose your pierce point, deepen it.

As the panel gets nearly flat high spots can be evasive. Just where is that ruler wobbling? It is helpful to place the ruler on edge and rotate it. It clearly turns on the high spots. End by hand sanding with a flat block of wood wrapped in 80 grit sand paper. This whole process can be tedious but

the beautiful laminations I get are testament that it is possible to make truly flat panels by hand.

If you are not going to laminate wood to the outside it isn't necessary to flatten the outward faces of the panels. If you do flatten both faces use a marking gauge from the first side. Even with your best efforts it is possible to get two faces that are flat but not quite parallel. That is to say one edge or end is slightly thinner. As long as it isn't extreme this does not pose a problem. The thickness of the two panels don't need to be exactly the same.

Put a completed side panel, outer face up, on the floor and put the paper template, face up, over it. You should still have at least ½ inch extra wood at the top and bottom and an extra inch at the front and back. Position the template on the panel using the colored seam line and the awl mark. Trace the outline of the templates onto both panels. Remember the extra wood for strap sags and tail collar.

You can band saw *the front and rear* profiles now, but not the top and bottom. In addition to strap sags there can be a reason for cutting the front edge of a side panel longer than the template calls for. If one front leg leads the other, the ***whole*** front of the animal slants toward the leading leg. Some of this slant will occur on the non-leading side panel. Trace your pattern on the non-leading side but dot a line outside that for band sawing. Diagram 4 shows how you end up with a notch if you cut right at template. (Because of the butt crack the rear profile isn't affected.)

Transfer the registration marks for cap, legs, and belly from the template to the panel. Extend the marks for the side-to-belly and side-to-cap **all the way around** the torso side panels. Remember not to make them too far forward or back. Do the same for the belly and cap panels.

For putting the template on the inside of the panel later extend the location of the pole centers onto the extra wood at top and bottom. Run these to the inside with a speed square. Up and down placement of the template is done with the five inch colored pencil mark.

Chest and Rump Pancakes

The pancake pieces for the chest and rump are made with short boards, often using scraps. The grain ***must be parallel*** to the sides, cap, and belly. Boards

swell and shrink across their width but not their length. Grain perpendicular to the torso will eventually pull the figure apart.

Pancake panels are often narrow enough to machine flatten in long lengths and then cut into pieces. As always, growth rings should alternate. The pancakes can have various thicknesses but ***make them slightly wider*** than the belly panel for now. Square both edges. This will simplify selecting them later.

It is tempting to lay out the pancakes by simply putting a side panel, outer face down, and placing the pieces to cover the front and back profile. This is a problem if the other side is longer due to leg position since the pancakes will be too short. You will also need the upper pancakes long enough to go past the leading edge of the saddle.

A few necessary steps: First temporarily tack the two side paper templates together, trappings outward, with double sticky tape. Use the belly line and poles for reference when putting them together. Do not use the colored seam lines as they are different on each panel.

Put a panel on the floor, inside up. It doesn't matter which panel you use so long as you put the correct template for that side against it. Place the doubled-up side templates over it. Some of the paper will go past the front and rear of the panel if it is the shorter one. Use push pins to keep the paper assemblage in place. Remember to reinforce the paper with clear tape where the pins go through. Transfer the upper, dotted line of the belly panel to the **inside** of the panel with carbon paper and darken it with pencil. It will be key when building the torso.

Front Pancakes: Leave the panel *and paper* on the floor and begin dry stacking pancakes over it. Start at the bottom, beginning at the ***dotted*** line of the belly panel. If there are seams in the pancakes stagger them.

Use the template combo to indicate how far forward to place them. With a 42" torso most of my chest pieces are about four inches long. However the area between the back half of the neck and the front of the saddle is narrow and it's easy to carve through the side panels there. To insure enough wood the upper pancakes should go ***a bit farther back*** than the leading edge of the saddle and about as far down as the midpoint of the knee rolls.

If the dry stack ends up much higher than needed thin one of the middle pancakes to keep the top pieces at full thickness. Diagrams 5a and 5b. Mark where the inside of each piece ends up on the paper. It is handy to have an indication on one of the paper sides where they end when you carve the withers and front of the saddle. Leave the top pancake a bit high. It will be planed down, along with the torso sides, after the second side is glued on.

Number the sequence of the pancakes and run registration marks across the seams. I use a "V" mark here. With them still in place put the belly wood, on edge, over the paper. The belly wood should have a reference line running all the way around it. The registration line on the paper needs to be extended upward a bit since the board will cover it. Run a registration line across the lowest pancake to the belly wood. Since the pancakes are still a bit wide there will be a slight step up. This mark is important so don't forget it.

Some wood can be cut out of the inside of the pancakes before gluing but cutting too much creates problems when clamping. Diagram 5c. (In this diagram the belly would have already been glued on but I did not include it for ease of illustration.) Here the side panel faces down but you will most likely be working with the belly down.

Don't trim out the top pancake. When you carve into the cap there may not be much wood left for the pole to go through so leave the upper pancake solid. On standers not much wood is needed around the pole. However on jumpers the pole presses hard against the front of the hole, especially if someone sits on the horse. At the scale I work I like to end up with two inches of thickness of wood in the front edge of a jumper pole hole.

Rear Pancakes: The rump panels need to be long enough to accommodate the groove between the legs. Don't attempt to rough these grooves out on a band saw before gluing. Use the doubled side template combo since the panels must accommodate the longest side at the rear. I like to have about four inches of wood at the tail hole. This hole will be drilled at a slightly downward angle and a screw will run up between the legs to hold the tail in place.

On jumpers, depending on your design, the upward sweep of the belly may remove much of the belly panel, especially in front of the rear legs. A longer rear bottom pancake is necessary since the jumper belly carries the animal's

weight. Refer to diagram 6. The pole presses against the rear of the hole. Like the upper pole I try to have about 2 inches of wood thickness there. If necessary this can be done with a beefy scrap block glued inside the torso. It should cover the entire pole hole so you can more easily cut the hole later.

Build up the rear stack, again starting from the dotted line. Put the belly board back in place and mark across the seam between it and the lowest pancake. Indicate on the paper the inside end of each panel so you don't carve through them between the legs. Now put the pancakes and templates aside.

Gluing belly to side panel

The belly to the first side must be a ***perfect*** 90 angle. Put one side panel, outer face down, on your bench.

Note: You don't want to lose the pancake-to-belly board registration marks. Begin with the torso side that doesn't cover them.

Place the belly panel below the dotted line that should have been transferred to the inside of the panel by now. Align the reference marks that run all the way around the belly and side panel. Control up and down slippage with temporary nails inside the torso panel and into the extra wood left below the belly. Diagram 8.

A friction-fit nail angled through the belly into the side will control front-to-back slipping. This is best located where the wood will be carved off later, such as behind the elbow. It is important that the two side panels are properly registered to each other later so carefully avoid slippage.

Dry fit the two pieces with clamps and place a carpenter's square inside the torso. To be accurate the square must run vertically up the belly and straight across the side. The belly-to-side angle is stabilized by making two temporary diagonal struts. Scrap wedges can be forced under the struts to fine tune the angle. If the angle is greater than 90 degrees use diagonal clamps to pull the parts square. See pictures 3a and 3b.

With struts and clamps at the ready, apply glue to both surfaces. Wait about two minutes to clamp. Scrape off any glue that has squeezed into the inside of the animal while it is still wet. You will be applying pancakes to this area so it must be clean. To remove wet glue a metal card scraper gets into the

corners better than a flimsy bass wood scrap. (Clean off the scrapers right away or they will rust.) Any extra glue on the inside ends of the top and bottom pancakes should be removed while wet since reinforcement strips will be snugged up against them later. Do not disturb the assemblage until it has cured at least overnight. Generally, full strength is considered to take 24 hours.

Gluing in the pancakes

To get room for clamps I now move everything off the bench and onto saw horses with the belly down. Don't try to glue in more than one pancake at a time. Start with the bottom one in the front, using the registration mark with the belly panel to position it. Temporary brads inside the belly panel work nicely as stops for the first pancake. Angling the placement of the feet of the clamps will prevent outward slipping. Diagram 9 shows clamping on the lower pieces.

As you apply glue to the faces re-spread it a few times to find dry spots hiding underneath. Avoid too much glue or it will literally get in the way of a tight seam. ***Don't forget to put glue on the edge and the corresponding part of the side panel.***

Tighten clamps from the pancake edge toward the side panel before clamping the face, otherwise it will be too hard to snug against the side panel. Do a dry fit first so your clamps are ready to go. You only have a few minutes to get both directions done. If you have bar clamps with deep throats place them as far into the faces as possible to apply pressure as close as possible to the center of each pancake.

You must get creative to apply downward forces on all four corners and the front and rear of the sides, especially as the stack gets higher. You always need a scrap stick (with waxed paper) to apply downward pressure on one corner. Sticks and scrap blocks are needed for side pressure when the clamp throats become not long enough. I made a drawing of the complicated assemblage in diagram 10. Study it carefully. The pancakes will still be a bit wider than the belly. Don't forget to clean off excess glue while it is still wet.

Once the front and rear stacks are glued place the torso on its side. Measure and pencil a line from inside the torso. Plane the pancakes even with the width of the belly panel. (They will still be high, as are the **tops** of each

side. See picture 4. If your plane is long enough you can make a quick check for local flatness by turning it on its edge. Picture 6. Finally check the whole figure for flatness front to back ***and diagonally***, just as though it was a solid panel. Picture 7. As odd as it may seem, if this side surface isn't exactly ninety degrees to the belly it doesn't matter.

The First Reinforcement Strip

Two-and-a-half by 2½ inch reinforcement strips run along all four inner corners of the torso, from front to back pancakes. When rounding the torso it is common to cut into these strips so butt them tightly to the pancakes since this seam will show. Later, to get the final height of the side panels and pancakes, you will be measuring from inside the body. It is convenient but not necessary to have the two lower strips come to the same height on the torso sides.

Glue the first strip before adding the second side of the torso. The belly to the inner surface of this side panel will be 90 degrees regardless of the angle on the outside. Don't bevel the strip or you won't have a clamp seat. When I glue a strip into a corner I take a whisker off the inner corner of the strip. I don't think you ever get that last molecule of old glue out. Since the inside surface is 90 degrees a square strip will have good contact. See pictures 8 and 9.

Next glue the reinforcement strip into the upper edge of the belly, leaving it a bit proud, then plane it level with the belly. Picture 10. Use a penciled line and a long plane placed on the finished pancake sides as a guide. This will make the strip a bit thinner than the other but the height will not be changed. Be careful not to take too much off. This is easy to do because the plane is registering on pancakes that are pretty far away. Picture 11. There is a fix for this mistake that I'll go into later.

The Second Side

Dry fit the second side and see if it can be rocked. Don't attempt to force it flat with clamps. If the panel rocks predetermine where to put pressure when testing and commit to that. Test the contact by spreading carpenter's string-chalk evenly on the inside of the panel. Slide it slightly from side to side without rocking it. Lift the side and check the chalk transfer marks. Picture 12.

Clean the chalk off the high spots of the pancakes, re-spread fresh chalk on the side panel, and continue flattening the pancakes until it transfers evenly. Finally, clean off as much chalk as possible before applying glue. I do this by alternating a card scraper and a block covered with sandpaper. Picture 13. It will not come completely clean.

Dry clamp the second side and look inside for the contact with the second reinforcement strip. Picture 14. If the strip gets planed down a bit too much there is a small gap along the top of it. Have a box of assorted thin wedges of scrap wood handy. Set aside the ones that best fit the gap. When you glue the second side add some glue to the wedges and **gently** slip them into any gaps while the second side is still wet. Picture 15. Don't worry about the grain direction but shoulder them close together. There is no need to trim them off.

With the second side glued turn the animal on its belly. Since there is still extra wood at the bottom of the side panels measure from inside the torso and draw a line indicating the top of the sides and pancakes. The dotted line on a paper side template will provide the height measurment. Plane carefully to the line. This will put the cap and belly on the same plane, which is important when drilling pole holes. Do a final check for flatness, down the length, side to side, and across the diagonals. It should already be very close.

Finally, glue in the reinforcement strips at the top. Leave them a bit proud. Once dry draw a height line on them and trim. Be careful with this, it is impossible to add wood to fix a gap here. Fortunately this joint is never under tension so a perfect seam isn't critical. If there is a gap, when the area is carved there will be dried glue in the void. This must be cut out and replaced with Bondo since dried glue will not take paint.

On Rose I rough shaped the outside of the torso before adding the upper strips. I then hollowed her out, using large calipers, with a Lancelot bit. (Rose was an unusually heavy horse). I left the reinforcement strips off until afterward to allow better access with this dangerous tool.

I knew from my side template I had plenty of wood for the pole even after cutting out the middle of the upper pancake. If I didn't I could have glued a scrap block to the underside of the cap. I maintained the cap/side

registration marks by running them near the seat of the saddle from the inside to the top of the side panels and down the outside a bit.

Because of the outer shaping I did not have good clamp seats for the upper reinforcement strips. I used carriage bolts and long nuts to apply pressure. See picture 16. If you try this don't overdo the pressure!

When the upper surface is planed flat turn the torso upside down. Plane the side panels even with the belly panel, taking that extra ½ inch off. ***This surface must be flat, with no twist.*** It must also be ***horizontal*** so check it with a long level**.** You may need to place shims if your shop floor or saw horses are off. Don't glue on the piece for the belly/girth yet. That has to wait until the torso/leg seams are perfected. How to do the legs is covered in chapter seven.

The Cap

Place the torso upright, align registration marks, and test the cap board with chalk but ***do not glue it.*** Having it removable will save many an anxious moment. If you accidentally carve through somewhere you can get back inside to add more wood. The cap should still be slightly wide in case it slips when being glued. Remember to extend the cap-to-neck registration mark across the top of the cap piece.

Once the cap dry-fits well remove it to add wood for the saddle. If you are going to add laminations to the torso sides the saddle wood must be as wide as the cap. Glue laminations with the growth rings as shown in diagram 11. If the wood wants to warp the edges are less prone to curling up.

Regardless of where the front of the saddle is drawn, the wood for the pommel (front) should extend ***beyond*** the proposed pole hole. You need this surface to cut the pole hole straight down. ***Do not*** extend the pommel wood into the neck contact area.

To laminate the saddle (or any broad pieces) pressure should be applied to the middle first, forcing excess glue outward. Lag screws and washers leave holes. An alternative is a long scrap of wood with a small block under the middle to concentrate pressure. With the torso well fixed to the bench top a second scrap is run underneath the bench to receive the clamps. This is much easier if the lower scrap is temporarily screwed in place.

Re-tighten the clamps a few times as the glue squeezes out. Evenness of pressure can be seen by viewing the upper scrap from behind. See picture 17. Try for a tight lamination. When carved through at a shallow angle, like the saddle's seat, gaps end up as broad glue pockets. These won't take paint and must be cut out and filled with Bondo later.

Thin laminations can flex when clamping. It is better to use a thicker board and carve off more after gluing. The surface is better left flat for the clamps anyway. If the lamination is thin and you want to avoid a lot of hand carving you can sometimes cut the piece of wood thinner on a band saw and save both halves. The top piece is then dry fit over the lower, providing even pressure. A small bump sawn into the surface will help keep the pieces registered. Diagram 12 shows this on the back half of a saddle.

The front half is still flat for drilling the pole hole. It is also a good clamp seat when gluing on the cap later, running a pipe clamp right through the body.

Note: If a large hole is cut through a carved pommel the profile changes. This is another reason to shape the area *after* the hole is drilled. The final shape should have a broadly rounded top in profile and from the rear. This is bulkier than a real saddle but will remain looking good from the side.

Once the hole is made the leading edge of the saddle is carved back so it covers less than half the hole. A 'cut-back' pommel where none of the saddle touches the pole is an option that allows the hole to be bit farther back. Cutting pole holes is covered in the next chapter.

During most of the carving I hold the cap, dry fit, on the torso with four large friction-fit common nails placed partway into predrilled holes. Drilling the holes at differing angles holds better than parallel ones. Remove one nail in an area for carving while the other three keep the cap in place. I drill holes at approximately right angles to my projected finished carving so the holes don't show up as much later.

The cap is still a little bit wide until after it is glued. It is only necessary to plane it flat to the sides where you will laminate wood later. To avoid unnecessary work I plane after the upper torso is roughed out.

Before Carving

Without a line it is hard to maintain symmetry once shaping begins. Draw a central line, front to back, around the entire torso. For the top, since the cap is not perfectly centered over the sides, you cannot use the center of the board for reference. Find the center of the chest and extend a line from it to the cap.

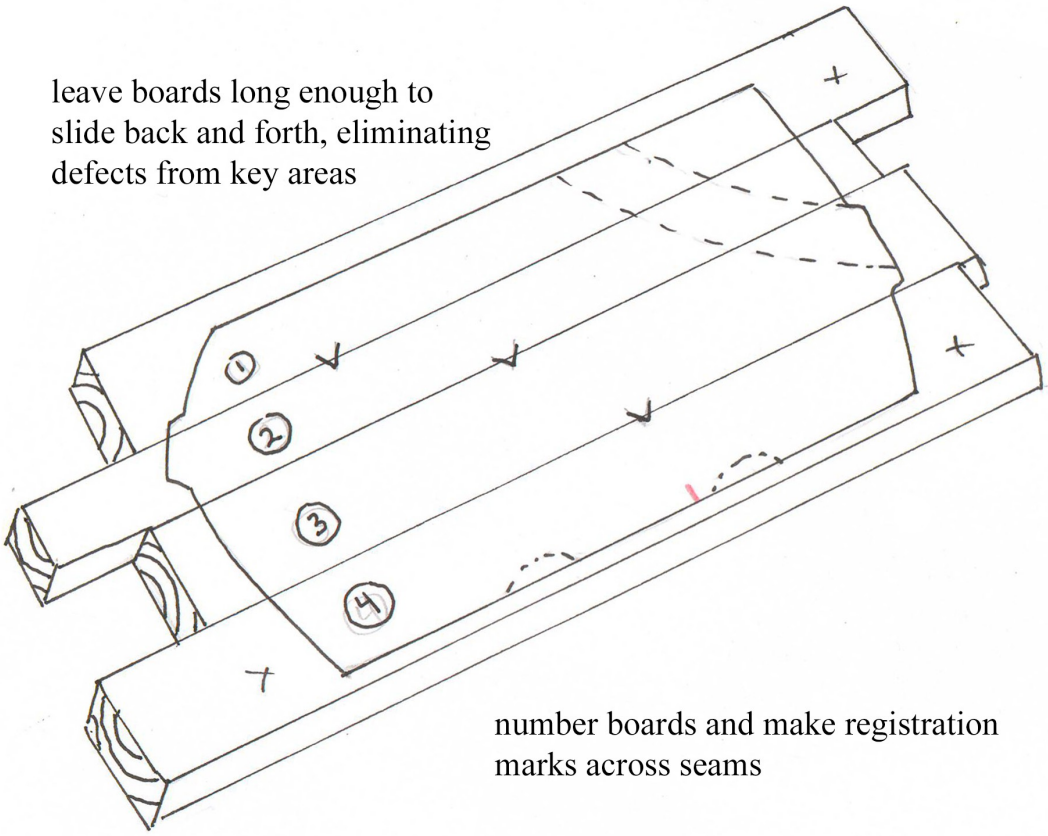
At the back find the center of the tail hole. Drill a small hole in **horizontally** and fairly deep so it doesn't get lost during carving. Place a nail in it. Run a tight string from a nail at the neck and the one in the tail. Bend down and sight along it to make sure it is straight. Pencil a line along the top. Redraw it as it gets lost during carving. For the underside of the torso, if the two sides have unequal thickness, the center of the belly board cannot be used. Even though the belly/girth wood is not on yet, run a central line from the nails down the underside of the body. This is important for marking the lower pole hole.

Chapter 5, dia. 3

Building a Side Panel

lay template over boards, trappings side up (not shown here)

leave boards long enough to
slide back and forth, eliminating
defects from key areas

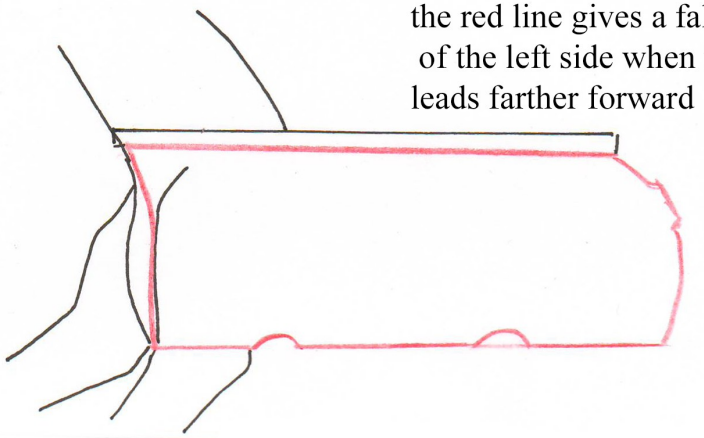


number boards and make registration
marks across seams

(small "X's" mark defects from both sides)

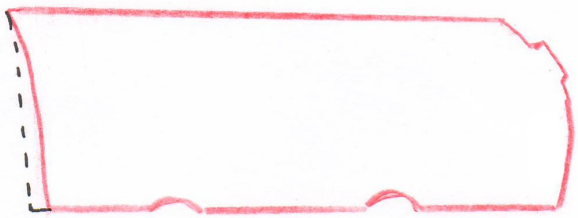
Chapter 5, dia. 4

Cutting a Panel When One Shoulder Leads



the red line gives a false indication of the left side when the other side leads farther forward

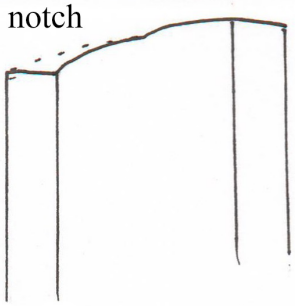
the chest leads too, and some of the wood for this will come from the left panel of the horse



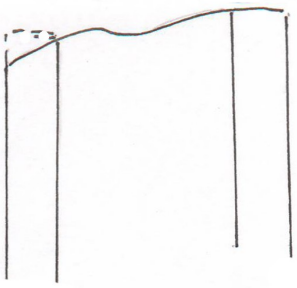
cut the left panel longer as indicated by the dotted line

a top view of the chest shows how cutting to the original line leaves a notch

notch



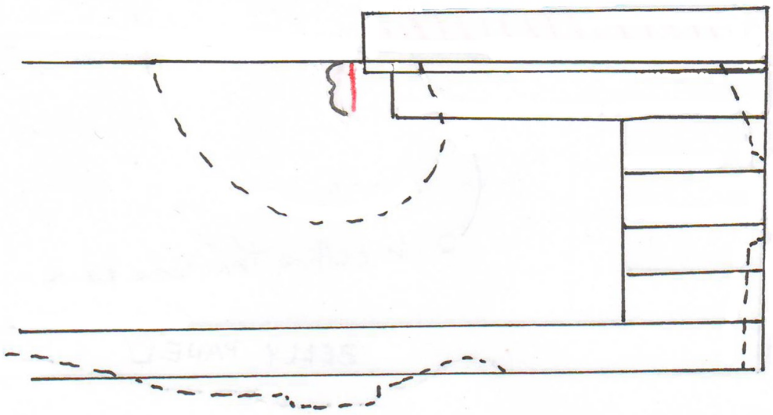
a longer panel is needed for the advanced chest



Chapter 5, dia. 5a

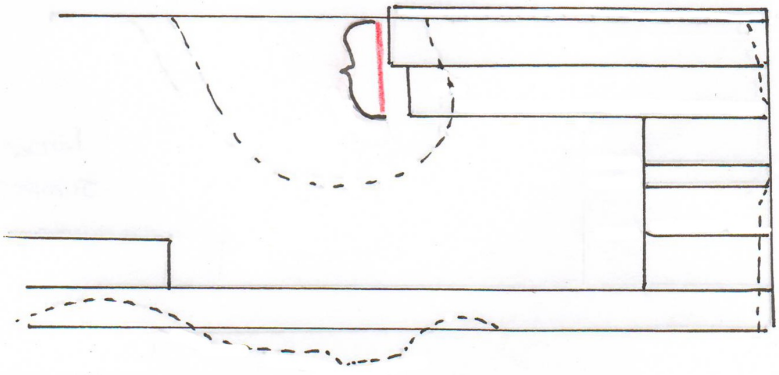
Problems With a Pancake Stack That is Too High

this stack far exceeds the topline of the side panel



trimming off the top leaves little wood for the whithers in front of the saddle

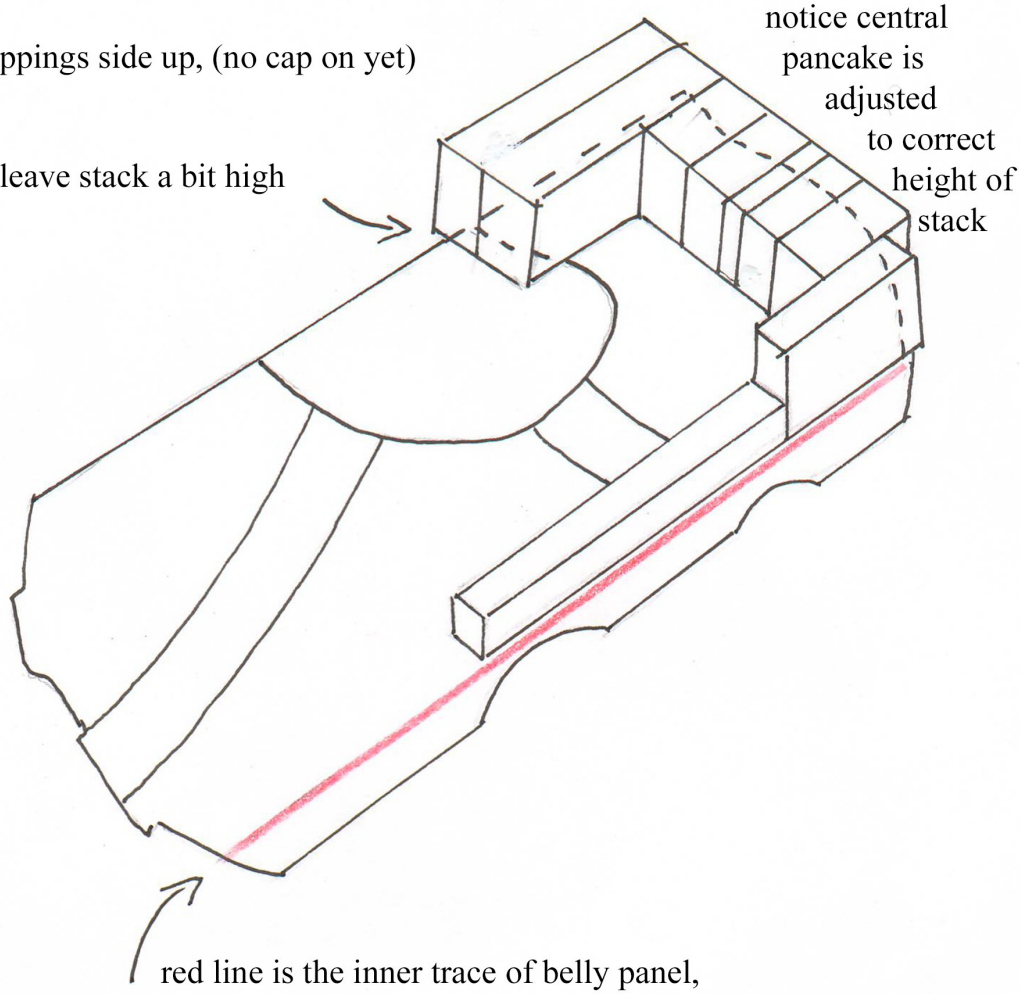
trimming out a center pancake leaves plenty of wood for the whithers, which are narrow and can be cut through if there is just a side panel



trimmed pancake

Chapter 5, dia. 5b

Pancake Layout


top two or three go back to saddle
notice central pancake is adjusted to correct height of stack
trappings side up, (no cap on yet)
leave stack a bit high

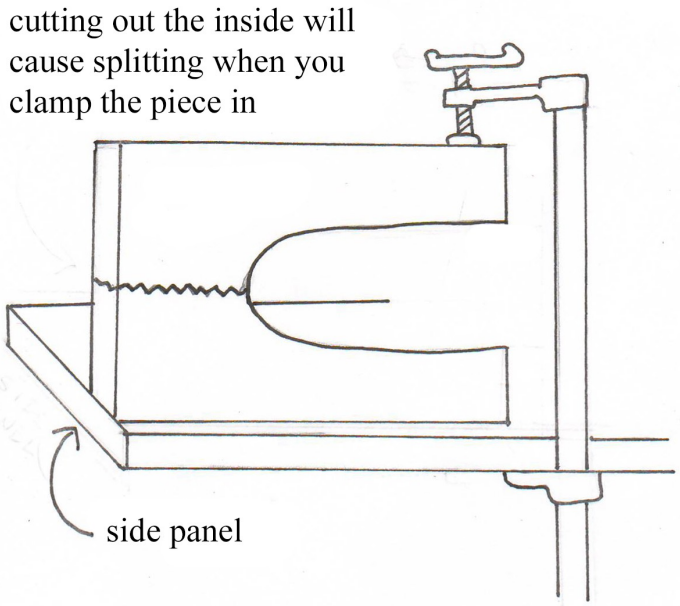
red line is the inner trace of belly panel, it should be marked on both the inside and outside of the paper template

(In other diagrams this is shown as a dotted line)

Chapter 5, dia. 5c

Making Pancakes

The belly panel would be on before the pancake is clamped. It is omitted here to simplify the diagram.



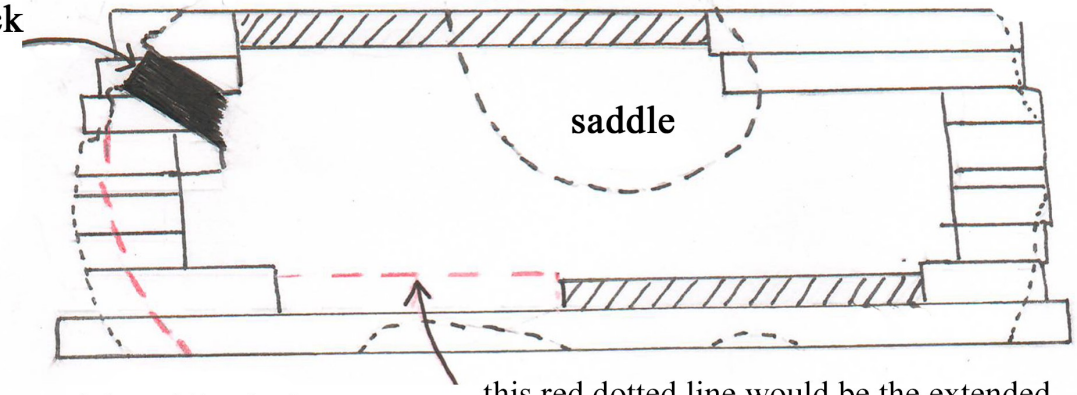
Chapter 5, dia. 6

Side View With Cap Piece Removed

upper rear pancakes should be
long enough to provide 4 inches
of wood for the tail hole

top pancakes go past
saddle

**tail hole marked
in black**



red dotted line is the
groove between the
rear legs

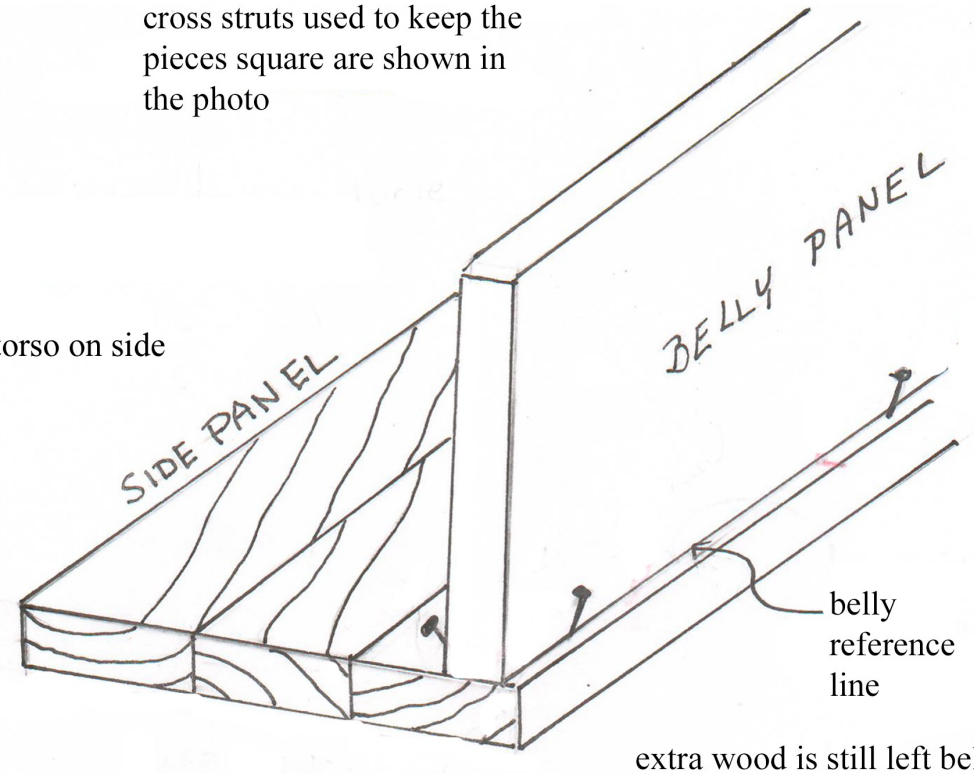
this red dotted line would be the extended
lower pancake on a jumper

be sure pancakes are long
enough that you don' cut through
the groove between the legs

the hatch marked strips are the 2"X 2"
corner reinforcement pieces
they do not need to be shown on the template

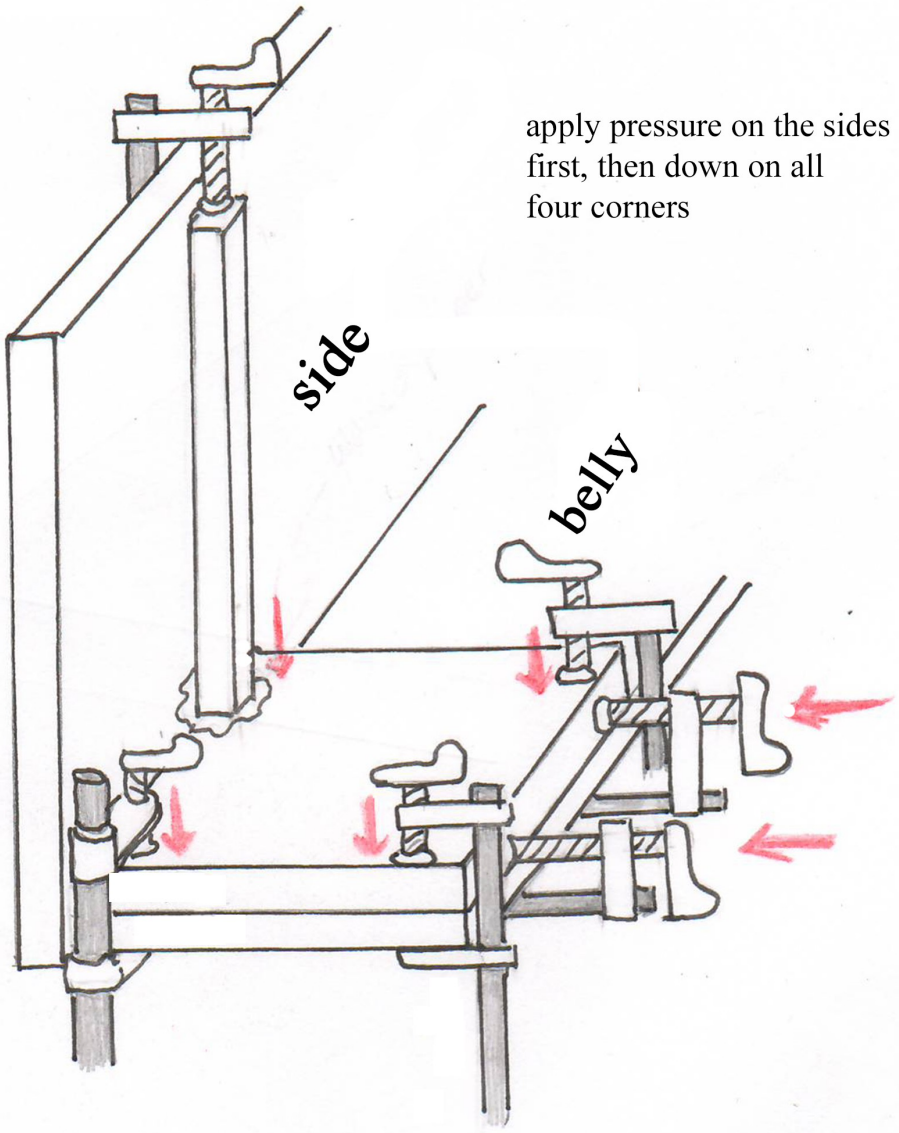
Chapter 5, dia. 8

Gluing Belly Panel to Side Panel


cross struts used to keep the pieces square are shown in the photo
torso on side
SIDE PANEL
BELLY PANEL
belly reference line
extra wood is still left below belly for placing temporary nails

Chapter 5, dia. 9

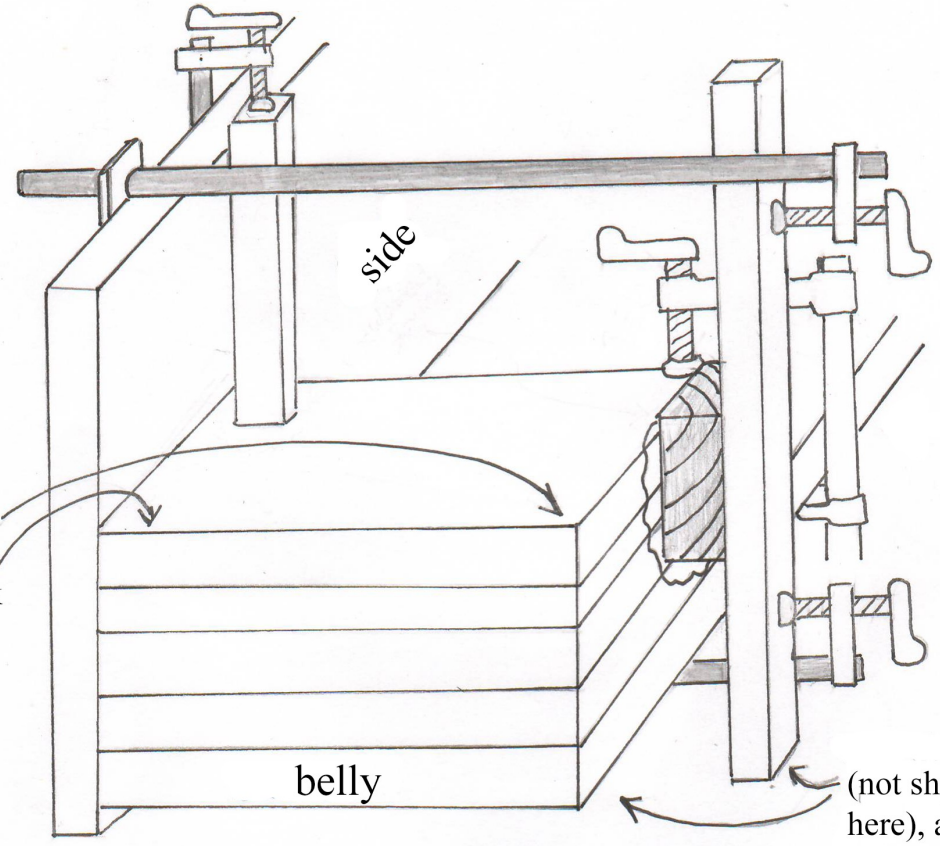
Gluing the First Pancakes


apply pressure on the sides first, then down on all four corners
side
belly
waxed paper prevents the scrap wood from gluing to the pancake

Chapter 5, dia. 10

Gluing Upper Pancakes

to apply side pressure a scrap block is placed under a long stick and clamps are run across the top and bottom of the stick



standard clamps will work here

for diagraming purposes clamps putting downward force on the front, indicated by arrows, are not shown here

(not shown here), a second set of clamps and stick will be needed for side pressure at the front

Chapter 5, dia. 11

Grain Orientation in Laminations

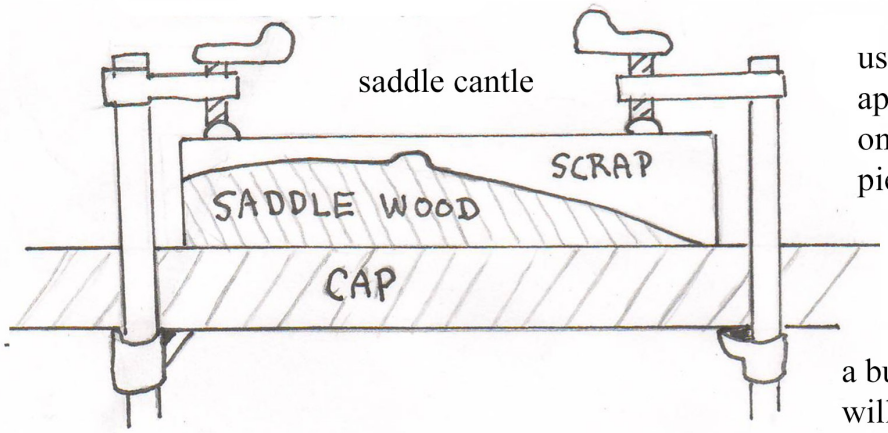
orient end grain this way, thin edges will
be under pressure during seasonal changes

remember rings try to "flatten out"

torso

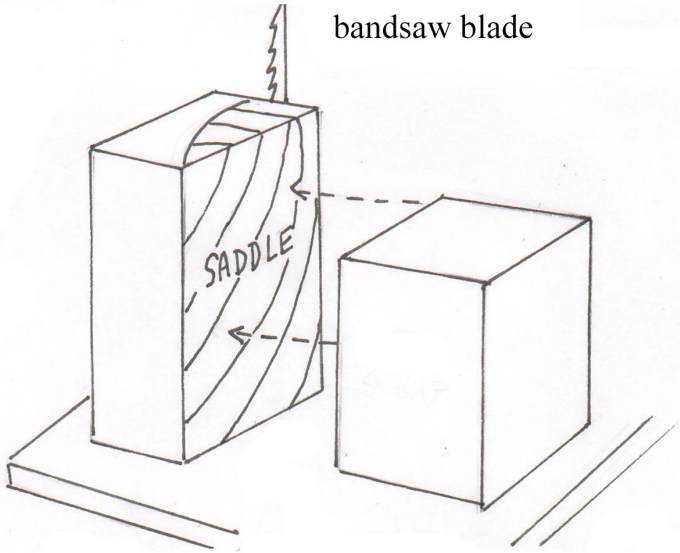
Chapter 5, dia. 12

One Way to Clamp Odd Pieces



use cuttout to apply pressure on laminated piece

a bump or nail will help keep scrap in place



a large, squared piece of scrap put against the piece to be sawn will keep it vertical

Chapter 5, picture 1

Checking a board for twist.

Sighting over clamp shanks laid on the boards will show up twist. It may not occur evenly. Placing several shanks on a board will indicate where to cut to harvest straight sections on very long boards.

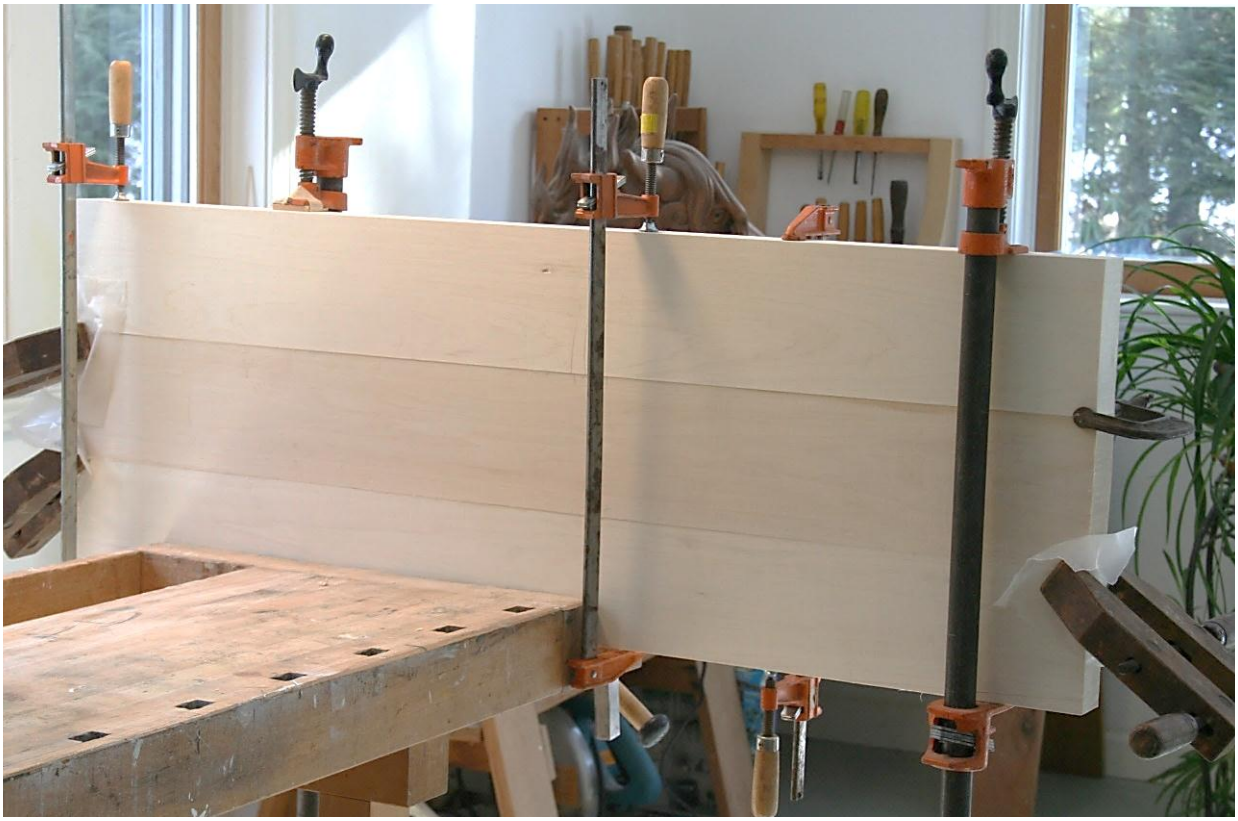
P

Chapter 5, picture 2a

Dry fitting a side panel.

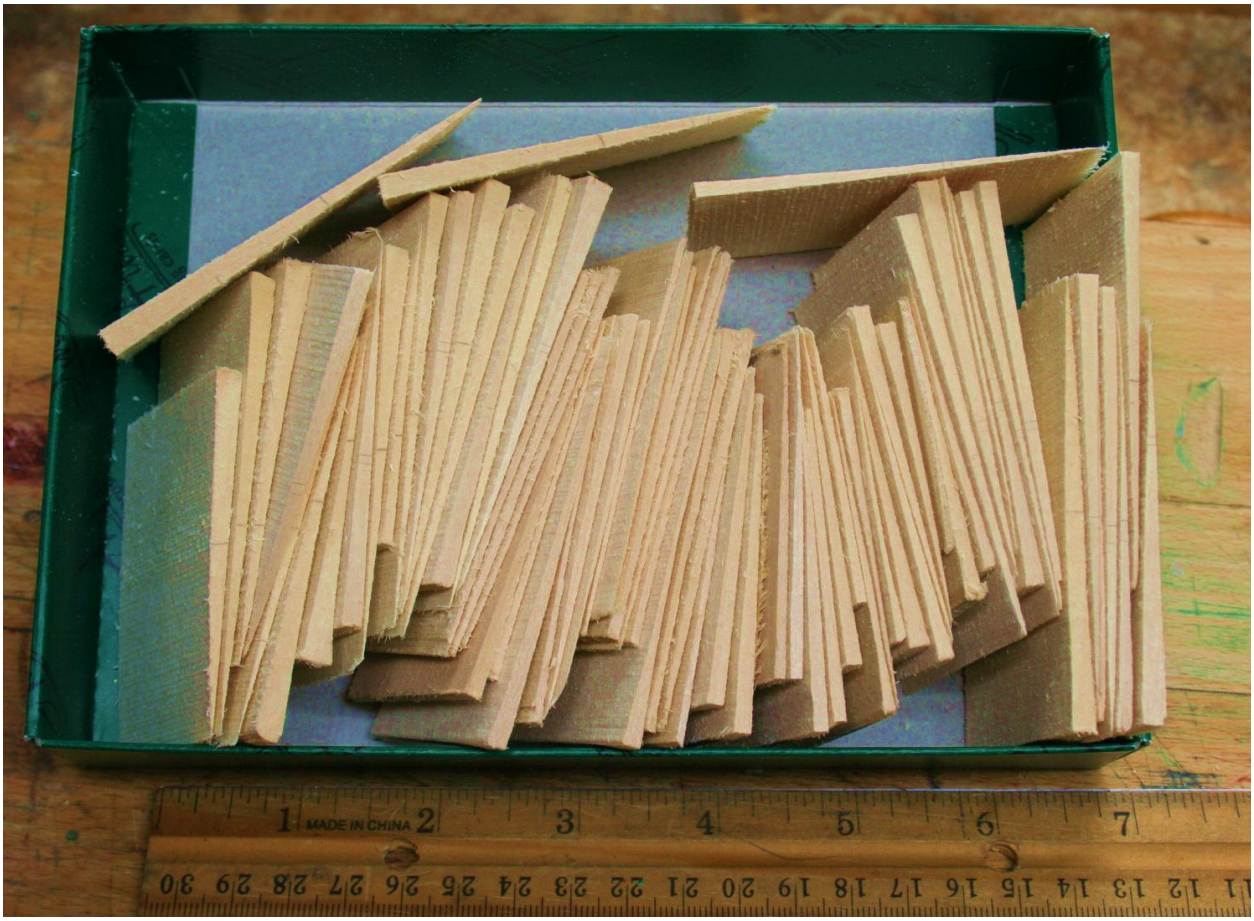
Growth rings alternate. Shanks run on both sides to minimize flexing. Clamps at the ends aid alignment. (Even though this is a dry fit I've shown waxed paper under the clamps as a reminder.)

Still without glue the clamps are tightened and the panel tested with a long aluminum ruler. No attempt is made to trim the panel to height yet. When gluing add only one board at a time.



Chapter 5, picture 2b

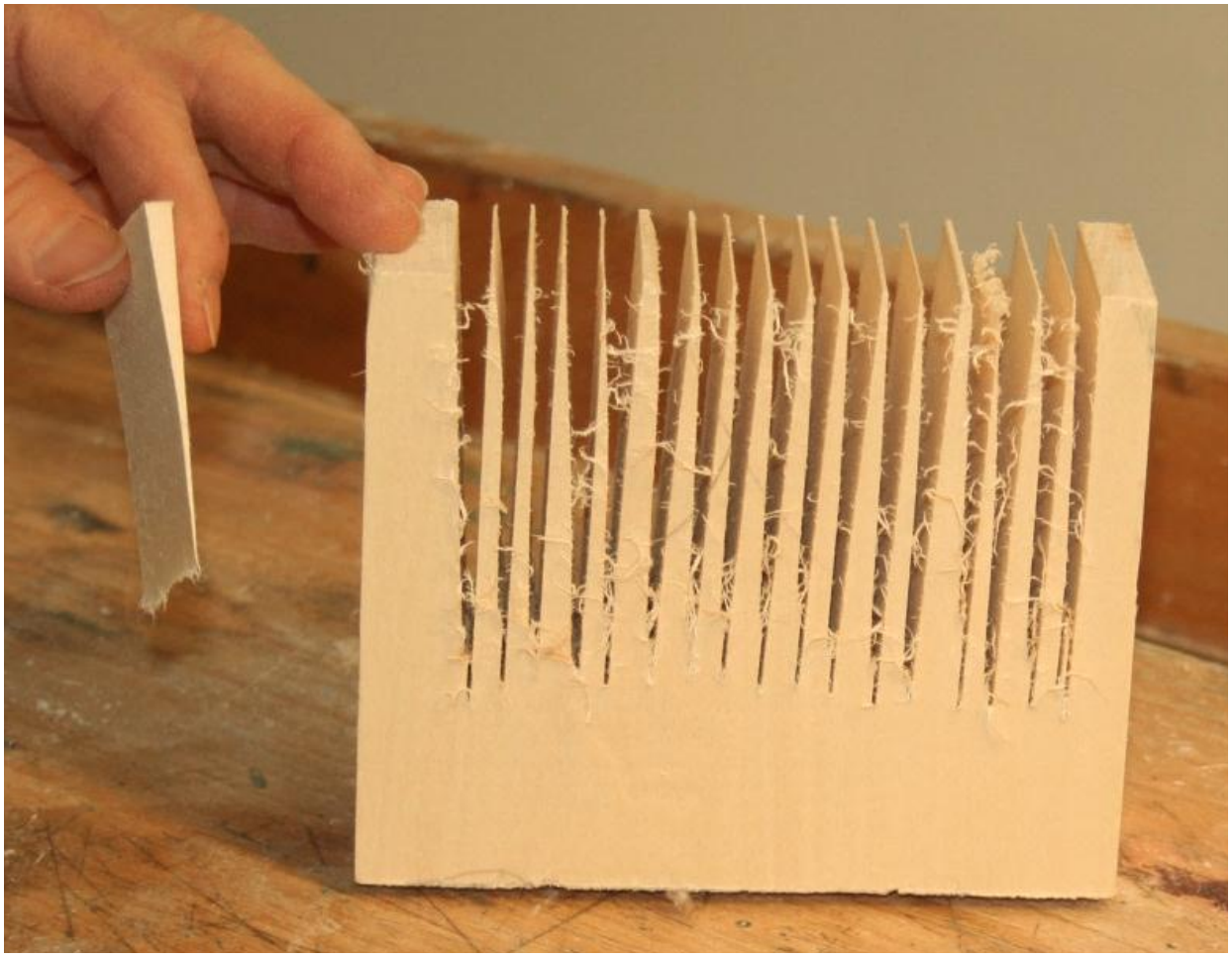
Box of assorted wedges, stored on edge to view their length and angle.



Chapter 5, picture 2c

Making wedges for spreading glue.

Wedges are made from a scrap block. Every other one falls out, the rest are freed with a cut across their base.

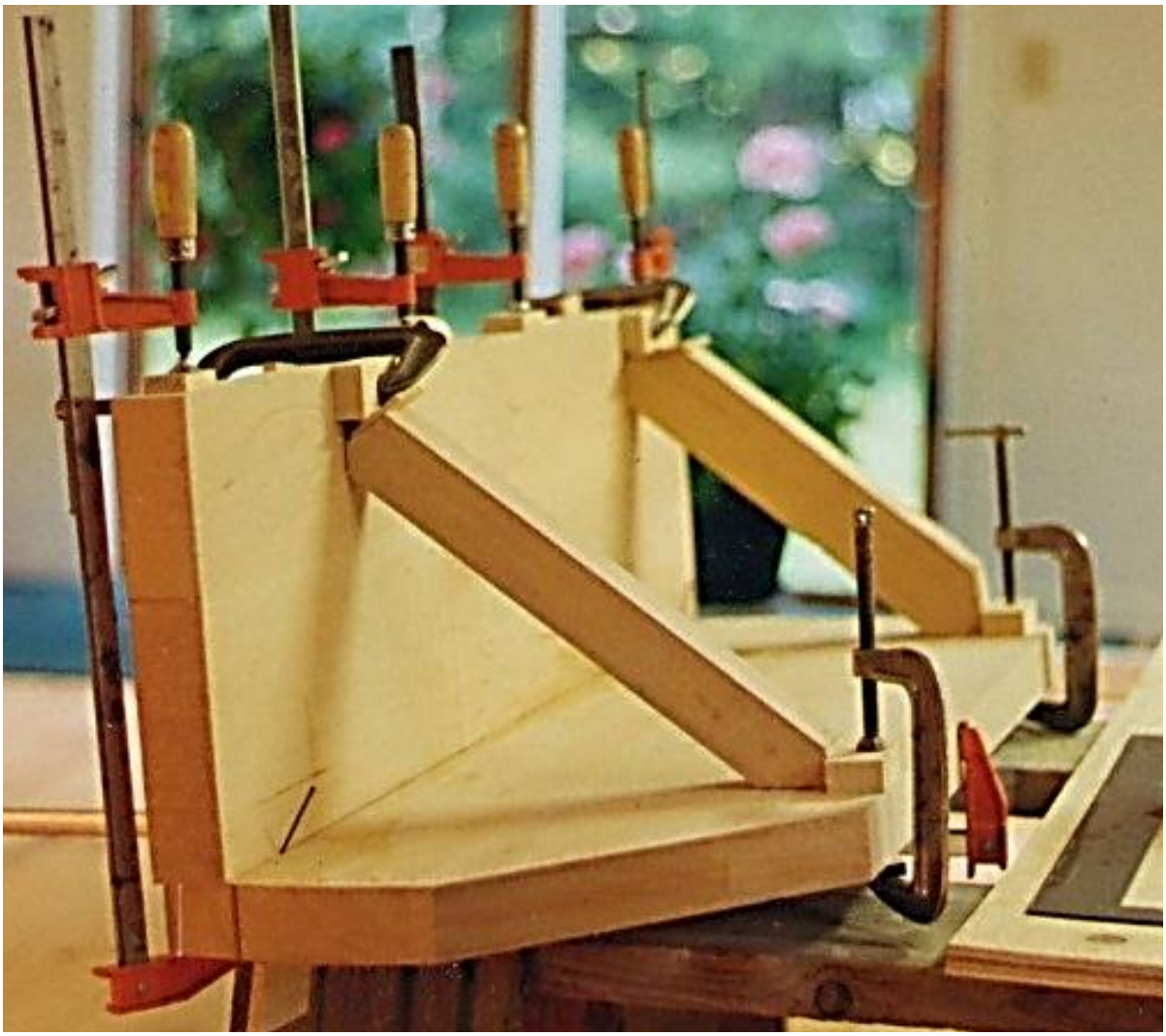


Chapter 5, picture 3a

Gluing the belly to the first side. (Slant necked horse, Hunter).

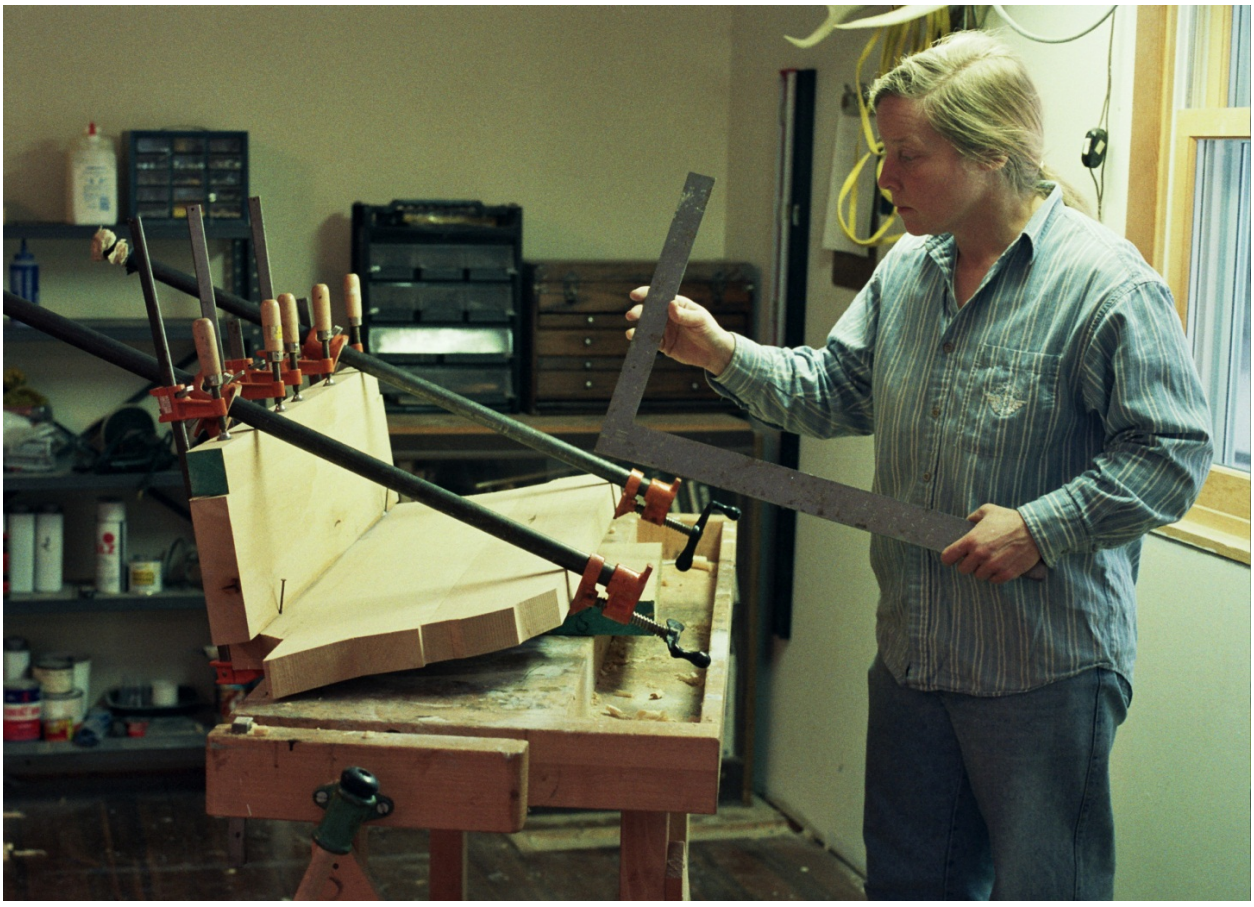
The figure is on it's side, the belly is to the left. Braces are used with stop blocks to keep the sides at right angles during clamping. Small wedges between the braces and the blocks fine-tune the angle. The two panels must be exactly 90 degrees to each other. If they make an angle greater than 90 degrees long clamps placed diagonally will pull them into place.

Nails inside the panel keep it from sliding up. The belly panel still has extra length and is sticking out slightly.



Chapter 5, 3b

Another belly-to-side glue up. This one needed clamps to pull the pieces into place, here being checked with a carpenter's square.



Chapter 5, picture 4

Flattening the pancakes to width. The horse is on its side, rear end to the right.

Once glued in the pancakes are made even with the belly. Measure and mark a line on the pancakes from the inner surface of the side panel. (This is easier to do before the first reinforcement strip goes in.) On this jumper you can just see that the lowest rear pancake is extra-long.

Chapter 5, picture 6

Planing the second side flat.

Initial checks for flatness are made by tilting the hand plane 45 degrees, using the edge of the plane and back lighting. The flatness of the whole side must eventually be checked along the edges and diagonals with a long aluminum ruler.

(The tape on the plane indicates which way to twist the blade lever, for some reason this tool works backward.)

Chapter 5, picture 7

Checking flatness.

A ruler is run front to back ***and both diagonals***. I do this before adding the upper reinforcement piece. If ***this*** side ends up not quite 90 degrees to the belly it's OK, so long as the surface is flat. The ruler should be long enough to cover the whole diagonal.

Chapter 5, picture 8

Dry fitting a reinforcement strip.

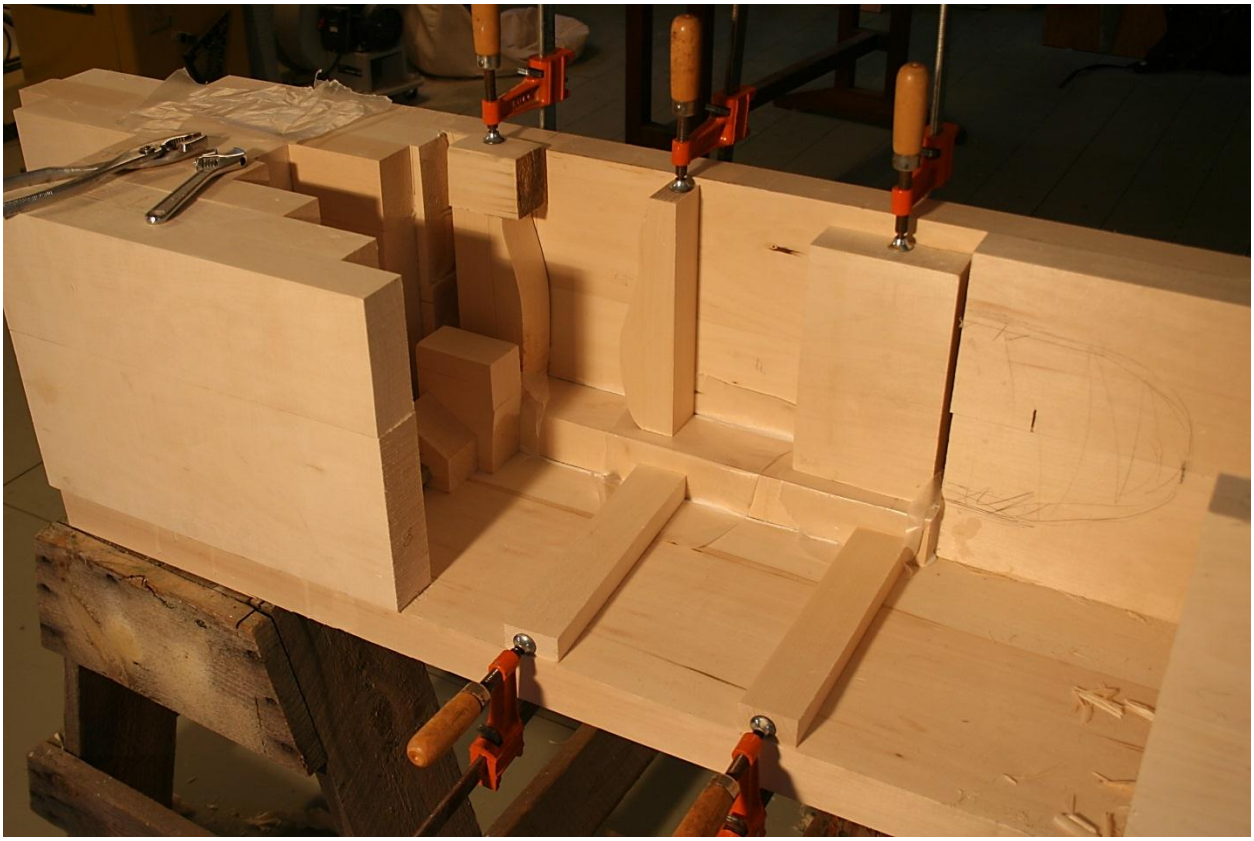
Here the torso is on its side and the first 2½ inch square strip is installed. It should fit snuggly against the pancake pieces. This gets glued in before the second side of the animal is on.

Chapter 5, picture 9

Gluing the first reinforcement strip.

The front of this animal faces left. A carriage bolt and long nut with scraps of wood are just visible applying pressure from underneath the top pancake. Although it is hard to see here, waxed paper keeps the scrap blocks from sticking.

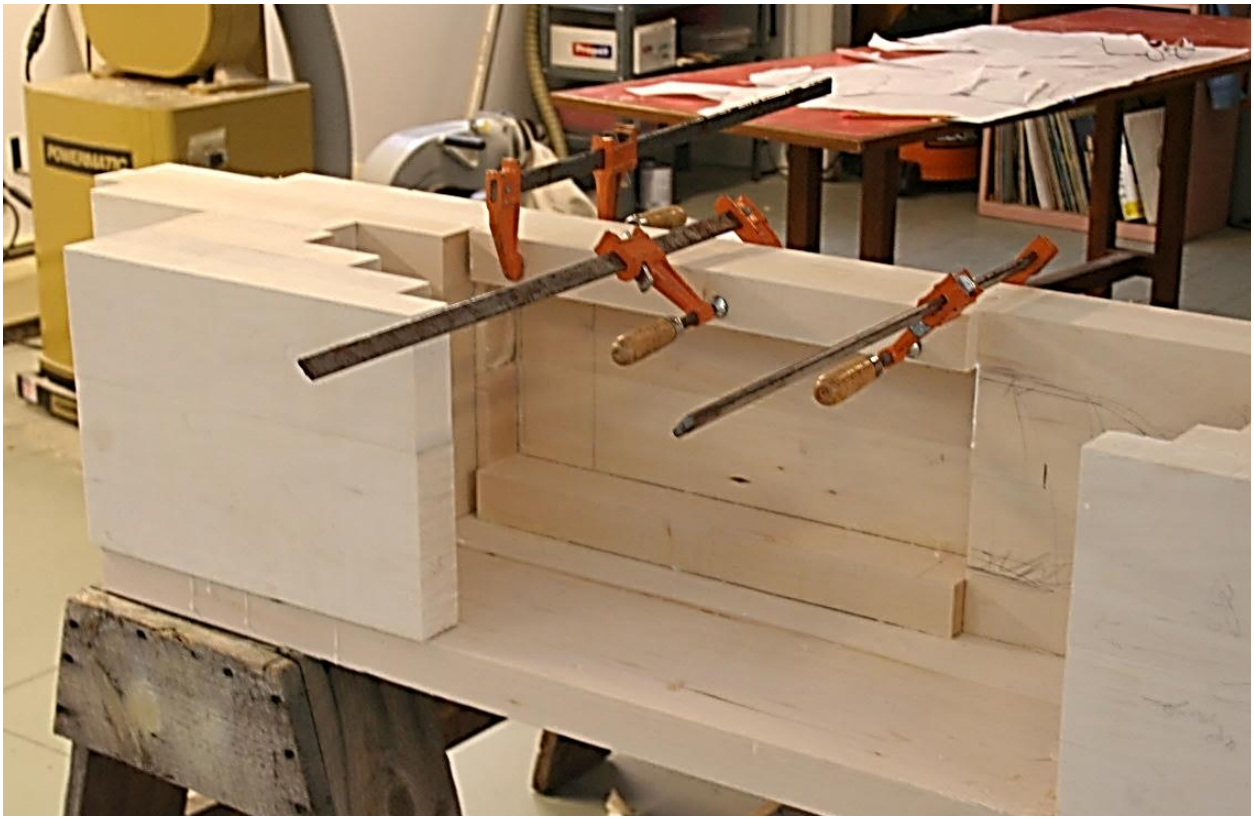
This is a jumper and has an extra-long, lower rear pancake.



Chapter 5, picture 10

Gluing the second reinforcement piece.

The belly is facing away from you in this shot. The strip is installed a bit proud of the pancakes and later planed. It is easy to plane too much off as you go in from the belly panel (the edge closest to you in the photo), but there is a fix.



Chapter 5, picture 11

Flattening the second reinforcement strip.

Measuring up from the inside and marking in pencil helps prevent taking too much off.

Chapter 5, picture 12

Apply carpenter's chalk evenly with your fingers and puff off the excess. Carefully place the panel on the torso. If it rocks dedicate yourself to applying pressure on the same two corners. Slightly shift it back and forth and lift to view the transfer marks. Clean chalk off the pancakes each time with a card scraper and repeat until an even transfer is achieved. You will have to recharge the chalk on the side panel each time. (This is Rose, with the extended front leg coming from the side panel).

Chapter 5, picture 13

Removing chalk with scraper.

The scraper has a mushroomed edge that lifts better than a sanding block alone. I am using a push stroke. (It will not come completely clean.)

Chapter 5, picture 14

Clamping the second side.

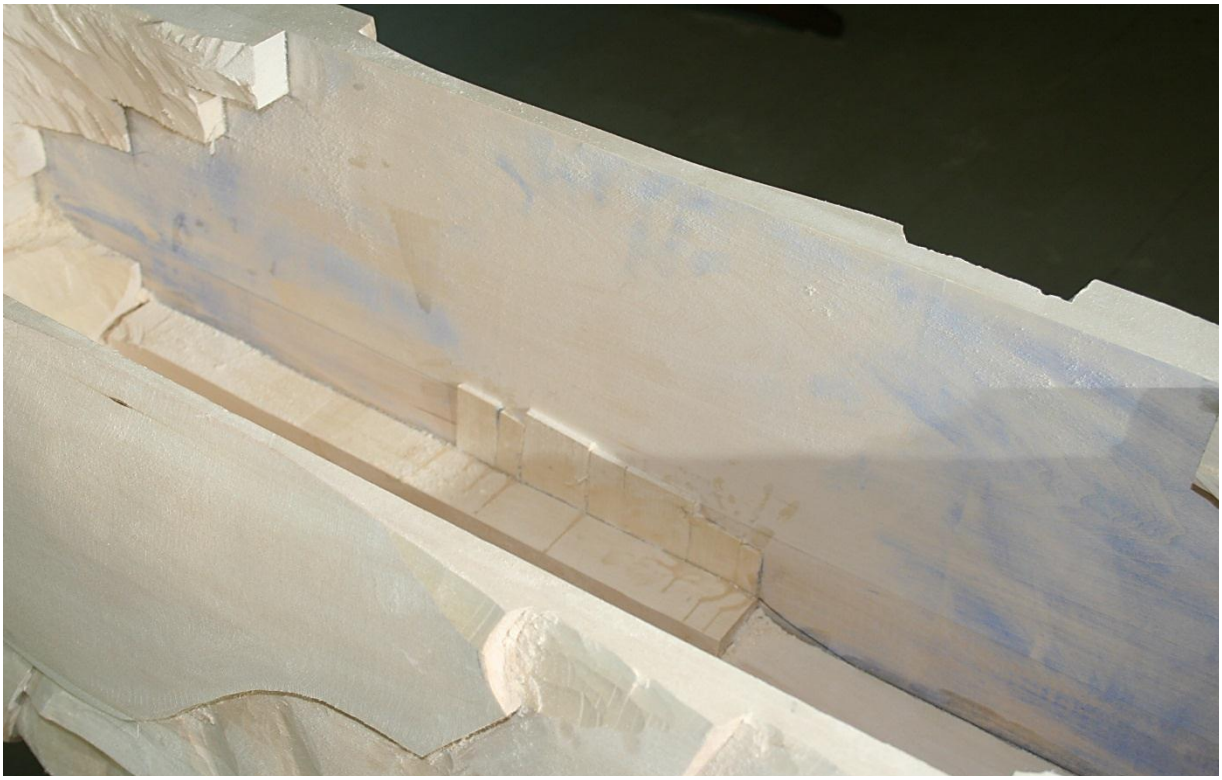
This is a dry fit. Align the reference lines and marks. Brads are in the extra height of the pancakes to prevent sliding. A few more are placed in the extra wood at the bottom of the side panel. You can't see them in this photo.

Chapter 5, picture 15

Fixing gaps in the second reinforcement strip.

You're looking down inside the torso from the top. (I've hogged off some of the interior wood with the Lancelot tool.)

It's easy to plane too much off part of the second reinforcement strip. While gluing on the second side I placed wedges into the gaps. With gentle trial and error the best fitting ones were slid in while the glue was still wet. Don't apply too much force. Shoulder them together snuggly but don't worry about grain orientation.



Chapter 5, picture 16

The upper reinforcement strips.

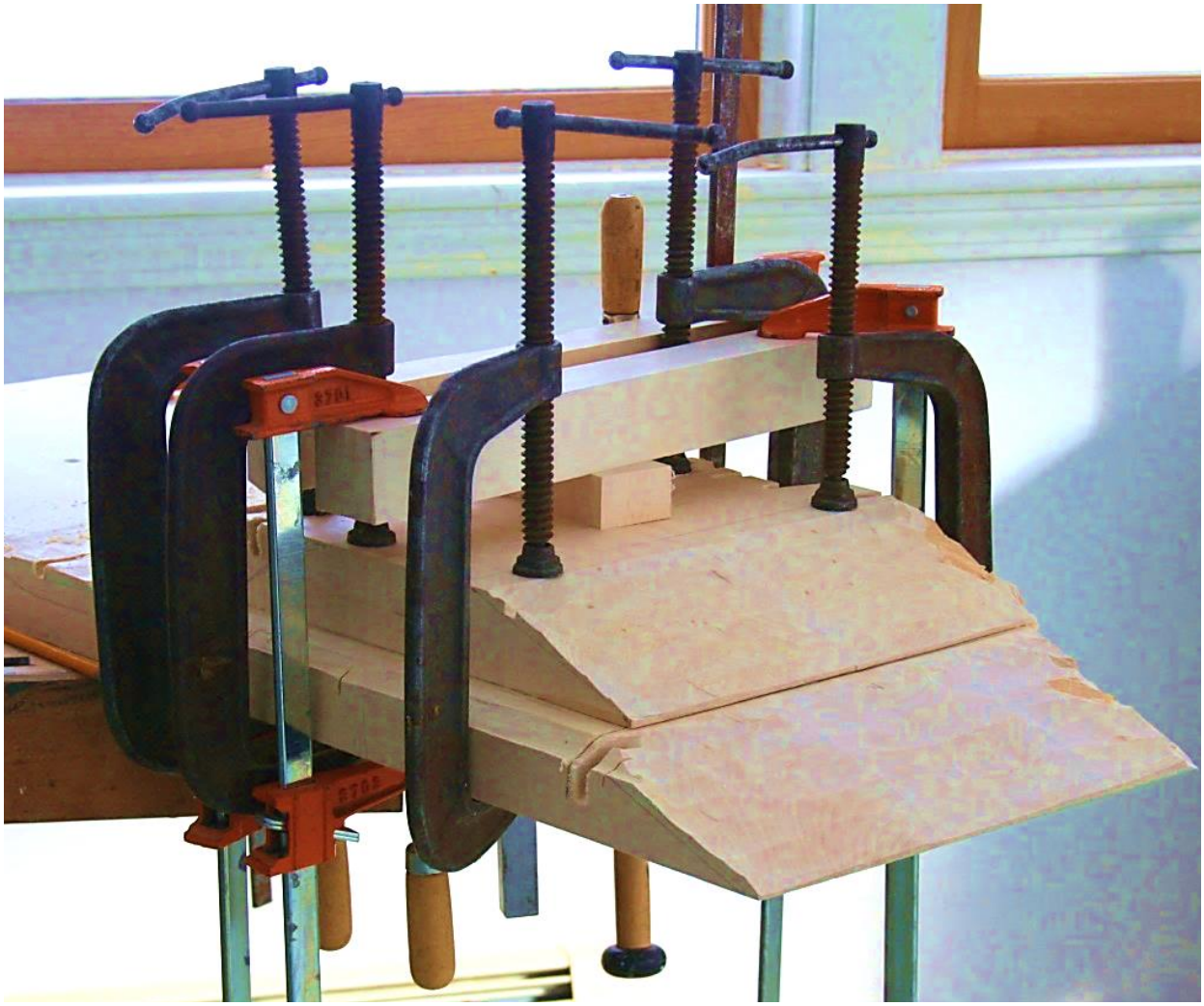
I'm using carriage bolts and long nuts because the sides were already shaped with the cap temporarily held on. I could have put the strips in earlier but I wanted room to get inside with the Lancelot tool after the outside was shaped. In this horse I knew I had enough wood at the top pole hole to allow the top pancake to be cut out.

Little wood from the side panels is left at the saddle seat. Reinforcement strips are needed since carving through the side panel often occurs here and in front of the saddle.

Chapter 5, picture 17

Building the saddle. (This is a dry run)

Wood for the pommel and withers is put on this slant-necked horse. Scrap strips, blocks and clamps apply additional pressure to the middle of this large lamination. Tighten the middle first to allow glue to squeeze out. After glue-up the slanted seam will be flattened. For now pommel wood extends beyond the pole hole regardless of the location of the front of the saddle. Since I was not laminating wood to the sides the pommel piece could be narrower than the cap.



CHAPTER 6

TRANSFERRING TRAPPINGS
LEGS AND NECK DOWELS
POLE HOLES

Transfer the trappings while the sides are still flat. Have the cap dry fit on snuggly with four large friction fit nails. The piece of belly/girth wood will not be on yet. That must wait until the leg contacts are fine-tuned. That is covered in chapter seven. Place the body on its side, fancy side up. With the template sides separated put the pattern piece for that side over it. Keep it in place with push pins. Put the pins where the wood will remain un-carved such as areas that will get laminations. Reinforce the paper where the pins go through with three or four layers of clear tape.

Important: On the wood ***make X's in colored pencil*** where the pins penetrate so you can find those spots again. You'll reapply the paper several times during carving and the pins do not leave any mark themselves. Trace trappings with carbon paper and darken with pencil. Picture 1.

As a reminder where not to carve, outline areas that will have future laminations and pencil large X's over them. Laminations get in the way and are added only after shallower details are carved.

Before carving the saddle/cap assembly use a speed square to transcribe the location of the pole hole center all the way across the top. The saddle surface must be left flat for this and for the jig. Use the torso center line that runs front to back to permanently mark the center of the upper hole with a small bit in your doweling jig. Go all the way through to the inside.

Draw squared cross hairs over the pilot hole. This will allow you to center the short pipe over it later. Although the wood for the girth is not on yet draw the side-to-side hole registration line across the belly panel. You will need this to put the belly/girth wood in place. A central pilot hole drilled for the pole now would be covered up by the new wood so it has to wait.

Dry Fitting the Neck and Legs
Installing Blind (Hidden) Dowels

Trappings are much easier to carve if the legs and neck are off and you can roll the torso side to side. Pieces can be temporarily held in place using a pair of hidden dowels and a few friction fit common nails installed at angles. This way parts can be slipped off when they are in the way. The holes for the dowels are made while the torso and legs are still un-carved and you have large, flat surfaces for the jig.

The Dowels: Dowels from a hardware store are not uniform. If you want to use them take a test hole drilled in scrap wood with you. You ***must*** cut a channel down one side with a veiner to allow glue to escape. Trapped glue absolutely will keep pieces from coming together later! Packages of dowels specifically for cabinet making come in standard diameters and have spiral grooves for glue to escape.

Hidden dowel holes are drilled about an inch deep and ***at right angles*** to the surfaces with a doweling jig. This jig is tedious to install so I leave an old drill set up permanently. Picture 2. A drill with a bubble level will ***not*** be accurate enough.

Leg dowels

The leg contact with the belly must be perfected with chalk before drilling dowel holes. (Making legs is covered more fully in the next chapter.) Flatten the upper leg seams before carving the legs so they can be held securely in a bench vise. Drilling for hidden dowels is done now for the same reason. You also get a larger area to seat the drill jig. The belly/girth wood is not on yet since it would be in the way of the jig on the belly board.

Remember to inset the legs an inch. To do this extend the leg connection marks that are on the torso sides onto the belly with a speed square. Perfect the seams on each leg using chalk. Then drill a pair of one-inch deep holes into the torso for each leg using the jig. Put a dowel-hole center-finder in ***one*** hole. (See center-finders in picture 5.) Transfer the mark by placing the leg blank over it and giving it a thump. Drill the first leg hole and put a dowel in to register the two pieces. Only then do you slip a center finder in the other torso hole and transfer the second mark and drill it.

Insert both dowels and be sure the two pieces come all the way together. A hole that is slightly off won't show until the parts are completely snugged up. Viewing the seam from the side will show you where a dowel is off. One side can be rasped

down a bit to make it fit but mark its orientation and label it because the dowels are removed during carving. (I cover this again in chapter seven since it can be confusing.)

Neck dowels

I usually make the holes in the neck first and then and transfer them to the torso. Holes can be drilled in the torso first but be careful the corresponding holes don't end up poking through the sides of the neck. Holes should be about an inch deep. They do not add strength and are only used to keep pieces registered during glue up. Pictures 3 and 4.

Pole Holes

This procedure was simple at the factories where specialized jigs and bits were available. Without them it takes more effort but it can be done with ordinary tools.

Upper hole:
Set the legless torso upright with the cap/saddle dry fit with the friction fit nails. The area making the front of the saddle to the neck attachment should still be flat for placing the doweling jig. In picture nine I didn't leave much flat wood so I used a drill with a bubble to rough out the hole. This is permissible on pole holes so long as the torso surface is horizontal.

With the cap horizontal center the three foot pipe over the crosshairs. Hold it vertically either with a level on it or by viewing past it to something vertical in the background like a door frame. The head should be dry fit to insure the pipe and brass sleeve clears the mane. Remember the brass will add a little thickness.

Pole holes are usually too big to be made with a single bit. Either with a doweling jig or a drill with a bubble level, make a ring of small holes inside the circle. The holes should be a bit inside the circle so you can tweak the hole with a firmer gouge after knocking out the center.

Firmer gouges have a bevel on the concave surface and are flat on the outside for going deep down. (When sharpening a firmer never round the outside!) As you go deeper keep checking the direction with the short pipe. Putting lipstick around the sides of the pipe's bottom and keeping it vertical will mark where to trim the inside. (How to explain lipstick in your tool box is your problem). Try not to split out the hole as you approach the underneath surface of the cap. You could end up losing wood in the saddle seat.

Smooth off the inside with a rasp. Make enough space for the pipe to slide easily but not so much that the brass will slip through the animal. Later on you will slightly enlarge the exit of the upper pole to allow the brass sleeve to seat a little way into it. The upper hole does not have to be perfect all the way through. Only the top two inches on the front of a jumper needs to be cut accurately since it takes all the pressure. Below that the hole can widen. Standers need only an inch since there is no pressure from the pipe.

The Lower hole: Remove the cap. With the leg contacts perfected and hidden dowel holes made flip the torso and glue on the belly/girth lamination. Pressure can be applied with scrap sticks or lag screws and washers. Avoid placing screw holes on the edge of the girth so they can be easily filled later. Leave the area un-carved until the lower hole is made. Re-draw the pole line that is on the belly wood over the lamination. Use this and the center torso line to mark the pole center. Use the jig and small bit and go through to the inside.

On standers there is a lot of fudge factor in the lower hole. Having a bit of slop insures the hole won't force the figure to tilt rather than stand on its feet.

On jumpers the horse will rest against the rear of the lower hole because the back end of the animal is heavier. If the hole is off the figure will tilt and the upper part of the pole may interfere with the mane. You need about two inches of wood at the back of the hole. If it looks like you won't have enough, or the hole is too far back, add a piece of wood inside with glue and screws.

Turn the torso over and dry fit the cap on. Drop the three foot pipe vertically through the upper hole. It can be hard to keep the pipe vertical on the first try. Keep the contact gentle. Concentrate on the front to back angle.

Put lipstick only on a small crescent section of the bottom edge of the pipe. When the pipe makes contact inside, if the angle is off, it can be lifted and reset. If there is lipstick all the way around you would get two or more circles. When the cap is removed you wouldn't know which one is correct. By only marking about a quarter of the pipe you will get short crescents on your first attempts.

When the pipe is truly vertical press down hard and rotate it to mark a full circle. In a perfect world it will be centered on the lower pilot hole and you can turn the horse over and make the pole hole from the outside. If the pilot hole is off work from the inside. Use a jig if it will fit. Otherwise use a drill with a bubble, being

sure the torso is horizontal first. Like the upper hole, drill the holes a bit inside the circle so there is wood for fine tuning.

To fine tune the lower hole place the torso upright with the cap in place. Put the leg attachment areas on two saw horses so there is nothing under the pole area. Lip-stick around the bottom and lower sides of the pipe. Run it through the cap from above and work down a little at a time, keeping the pipe vertical. The cap will need to be removed several times. This is tedious but I know of no better way to insure the holes line up.

On a jumper the front and sides of the lower hole can be a little big but the rear half gets a lot of pressure. To prevent possible splitting ease open just the very bottom of the hole after the belly has been carved.

This is the best time to check that the washer and pin to support a jumper will lie flat on the belly. With the figure on its side you can still alter the location of the girth or carve a crescent into it. The pole hole must not be farther than one third into the girth. The support pin runs through the center of the pipe and must lie at the belly, not the girth. If is lies at the girth the washer will be left hanging.

Finally, cut a small cone-shaped bevel on the ***inner*** face of the holes in the belly and cap wood. This will greatly aid in sliding the long pipe through later.

Shaping the Torso

I work from sawhorses now since my bench is too high. The legs are off. Remove bulk with a carpenter's chisel that has a steel tang all the way through the handle. Carving tools with wood handles will split under heavy blows. I use a 1½ inch Stanley chisel, my "whopper chopper". Later I switch to wide, shallow gouges and a lighter touch. Replace the center line as it gets carved away.

The legs and neck are off so the torso can be rolled from side to side. Use some padding and wedges to stabilize it. Don't glue the cap yet so you can get back inside to add wood if you carve through.

Tip: Keep a few areas on the sides untouched to keep track of how deeply you have carved. Carving trappings is covered in chapter 8.

The end grain of the chest and rump can be tedious to trim down. Here a Lancelot bit or five-inch sanding disk on a drill come in handy. (Beware, the Lancelot is

very aggressive and can cut too deeply.) Remember to leave extra wood for strap sagging and a raised collar around the tail.

While rounding the belly its shape can be better assessed by looking at it from various heights, providing a progressive view. Power sanders are handy for roughing out but they leave flat spots. Find them by running the palm of your hand over the surface. Use a flat riffler to knock off high places and hand sand to 80-grit.

Shaping the Saddle

With the cap temporarily held in place the saddle's seat area can be rounded more quickly by making several cuts with a hand saw and knocking out chunks between the kerfs. Then proceed with large gouges. Picture 7 and 8. (Because I had a visitor to the shop I had Hunter's head dry fit for show in picture 7. It is not needed at this point.) I do not advise using a hand saw to round the belly. That area is more square and cutting too deeply is a real possibility.

The rounded shape of the cantle when viewed ***from above*** is a bit tricky. Redraw the center torso line. Carve one half of the cantle, from above, to your satisfaction and make a pattern with an acetate sheet on the center line and tracing the saddle shape on it. Cut the sheet and flip it. Aligning the sheet on the center line trace the shape on the wood for the other half. See diagram one.

The topline of the cantle ***from the rear*** is assessed by placing a level on it. Be sure the animal itself is level. Picture 9. Since the pole hole has been cut you can shape the front of the saddle. I leave a small area un-carved for a clamp seat when running a pipe clamp through the torso to glue the cap later.

Tail Hole

The tail exit point should already be indicated by a small, deep hole made ***level*** with the belly and cap. No matter how much you shape the rump this hole will permanently mark the tail exit. Be sure to leave a raised area for the collar. After the rump is carved the exit hole will start there but it will be carved in at a downward angle. This allows a screw to be run up between the legs to hold the tail.

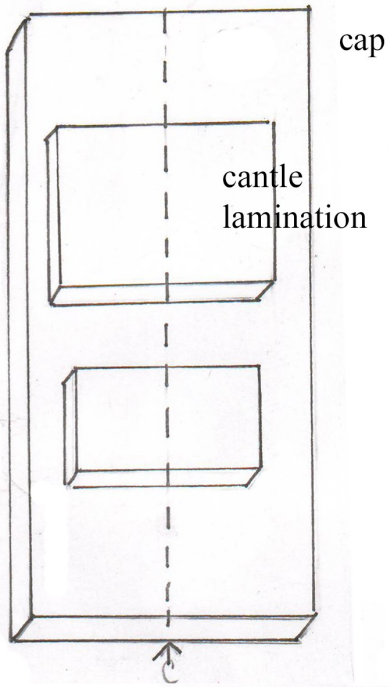
Don't draw the tail hole until the rump has been shaped or it will not end up round. Use dividers to scribe the inside and outside of the collar using the pilot hole. I wrap hair tails around a 1¼" diameter dowel about 8 inches long. Having this

already made up will give you the size needed for the hole. Leave about 3/8ths inch of wood around the rim to prevent splitting. A round riffler smooths the outer edge. Pictures 10a, 10b, and 10c. If you are making a wood tail, taper the hole slightly. This will aid in shaping the bung with chalk later. See pictures 11 and 12.

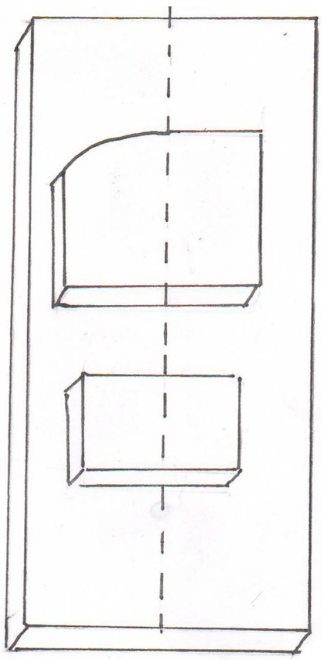
Chapter 6, dia. 1

Rounding Cantle, Top View

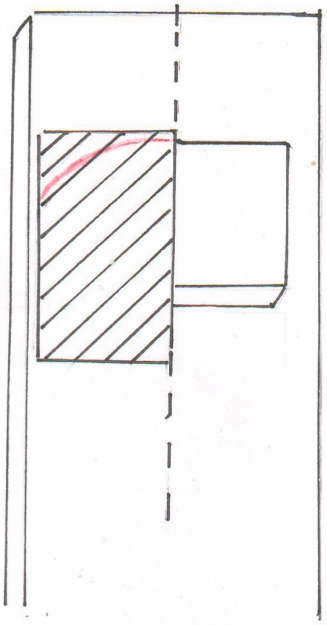
1) draw center line



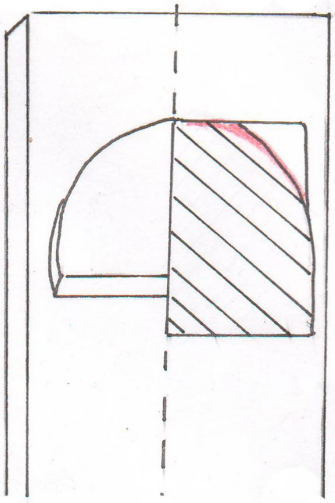
2) shape first half as desired



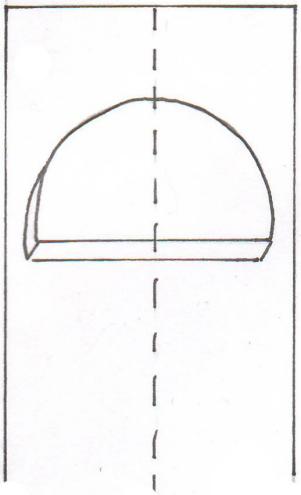
3) put an acetate sheet on center line and trace shape from above



4) cut acetate along tracing, flip,it and lay it on center line, copy the outline to second half



5) carve second half



Chapter 6, picture 1

Applying a template.

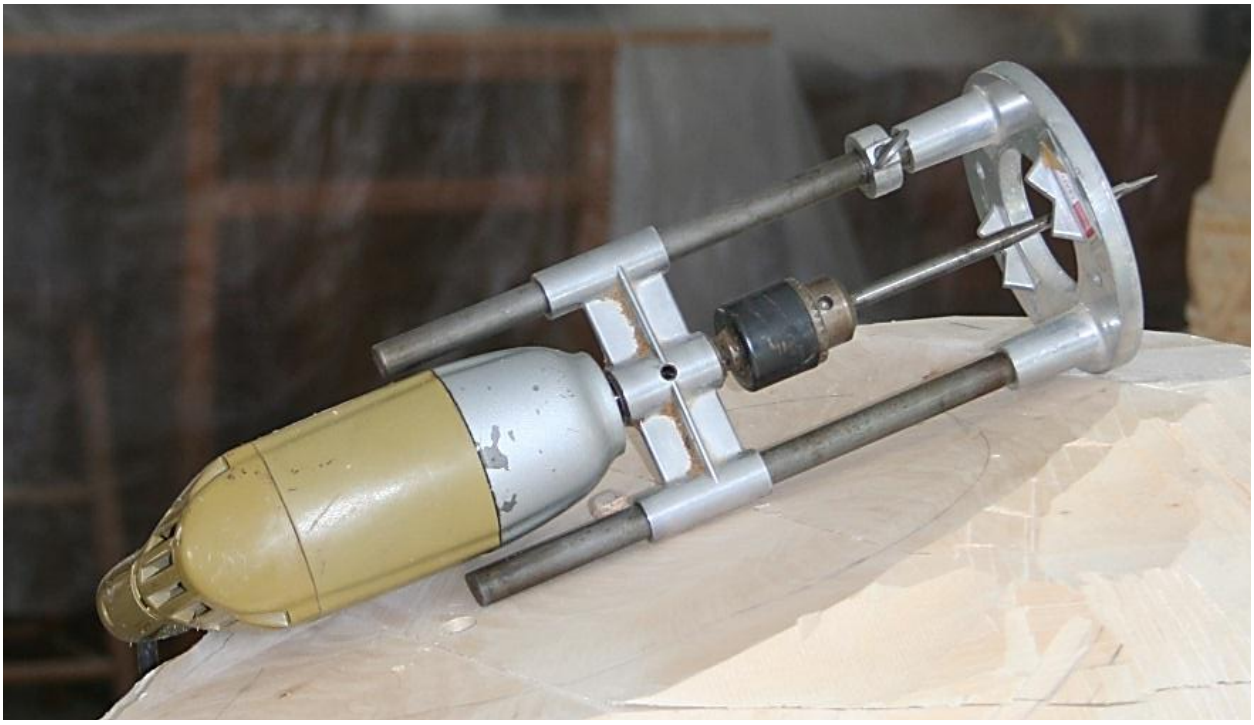
The sides have been planed flat to the belly. With carbon paper underneath I put the template on the belly line. Here I had not yet trimmed the belly/girth paper off so I folded it over the edge. Front-to-back placement can be done with the reference mark on the belly or the dimple. Push pins are holding the template in place. In this photo I had already marked and cut out some of the wood in front of the rear legs and behind the elbows. This can be done later however.

I have marked the upper pole so the cap is just leaning against the top in this photo. Plastic sheeting keeps dust off work areas when I am power sanding.

Chapter 6, picture 2

A doweling jig.

Hidden dowels must be put in at right angles to the surfaces. (This is a longer bit than needed). The drill slides down the side posts that are fixed to the base. The stop that is on one shank has not yet been set.



Chapter 6, picture 3

This is Rose, where the torso angle was shallow enough not to need a panel of wood added.

On her I drilled the holes into the torso first. A sharp bit is essential. To prevent creeping I often tack three nails around the base.

Chapter 6, picture 4 Hidden dowels

Drill two holes in one surface, dry fit the dowels, and trim them to about one inch. Remove them and put a dowel center finder in **one** hole, then mark and drill the corresponding hole. Dry fit a dowel in this to register the parts and put the center finder in the other hole. Then transfer the mark and drill the second hole. Misaligned holes won't show up until the final snugging. If the second hole ends up slightly off, file one side of a dowel to make it fit. It will be removed and put back several times so mark its orientation. Spiral grooves allow glue to escape.

Chapter 6, picture 5

Dowel center finders.

They come in packages of assorted sizes.

Chapter 6, picture 7

Rouging out the saddle with a handsaw.

To rough out the saddle you can carefully make parallel cuts with a saw and bang out large pieces with a heavy chisel. Hunter's head was temporarily on for show. The pommel area is left flat until the pole hole is drilled. The cap was later planed to the sides, after glue up, where laminations were needed. I have moved one friction fit nail to the center of the pommel to hold the cap in place. Two more are out of frame in the back.

Chapter 6, picture 8

Rose, the rounding has begun.

The end of the bolster pillow, the top line of the animal's rump, and the areas where the cherub's head and arms will be laminated are penciled on. The other circles will be roses. Hunter is watching! (The cap is still dry fit, nails removed for the photo).

Chapter 6, picture 9

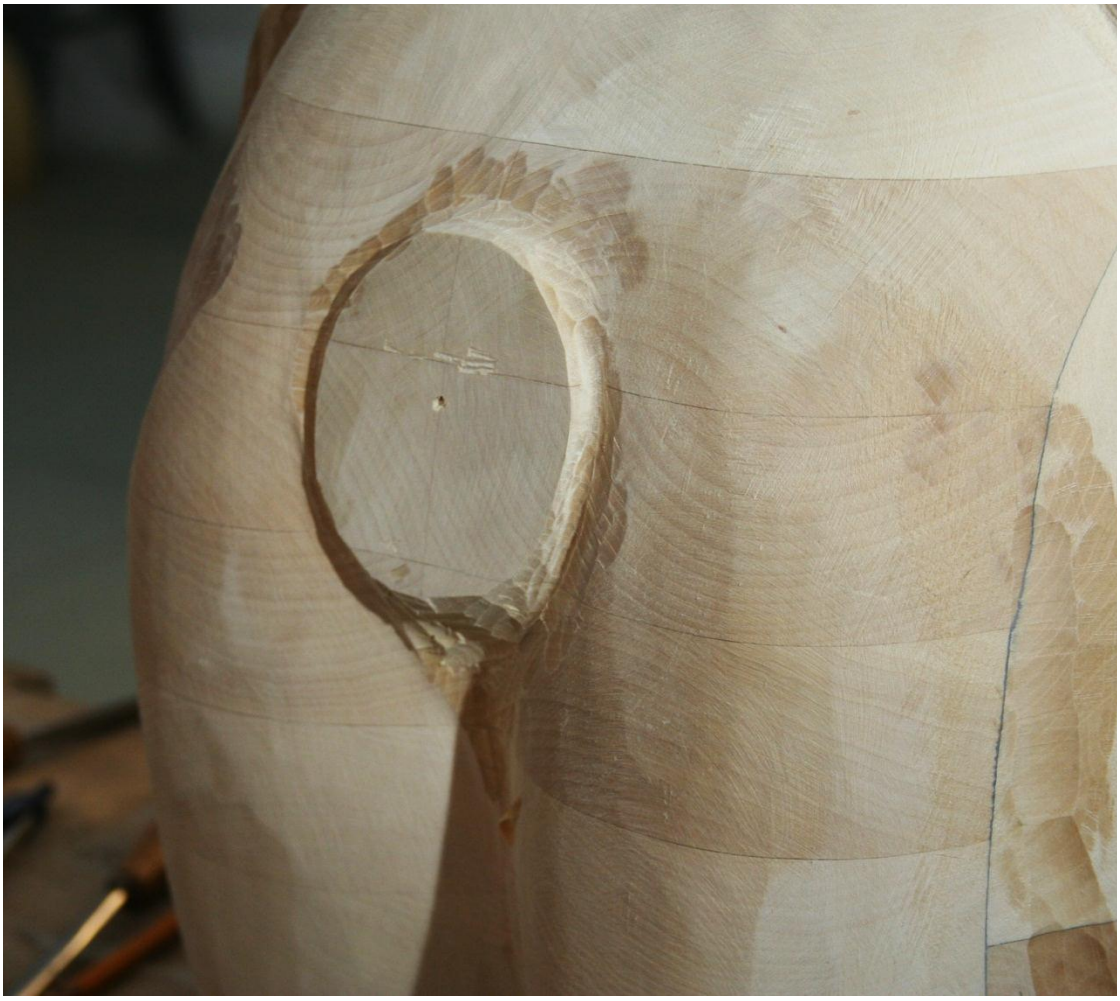
A level on top of the saddle helps evenly shape the top-line of the cantle.

On this figure the pole hole has not yet been made. Usually the hole is made before cutting the leading edge of the saddle to provide a large area to seat the drill jig. In this case I used a drill with a bubble after insuring the torso was horizontal. This horse ended up with a “cut back” pommel.

Chapter 6, picture 10a

Tail hole.

A generous raised area is left around the tail hole. The small hole drilled ***horizontally*** into the center earlier provides reference as carving proceeds. The rump must be shaped before the finished hole is drawn with dividers.



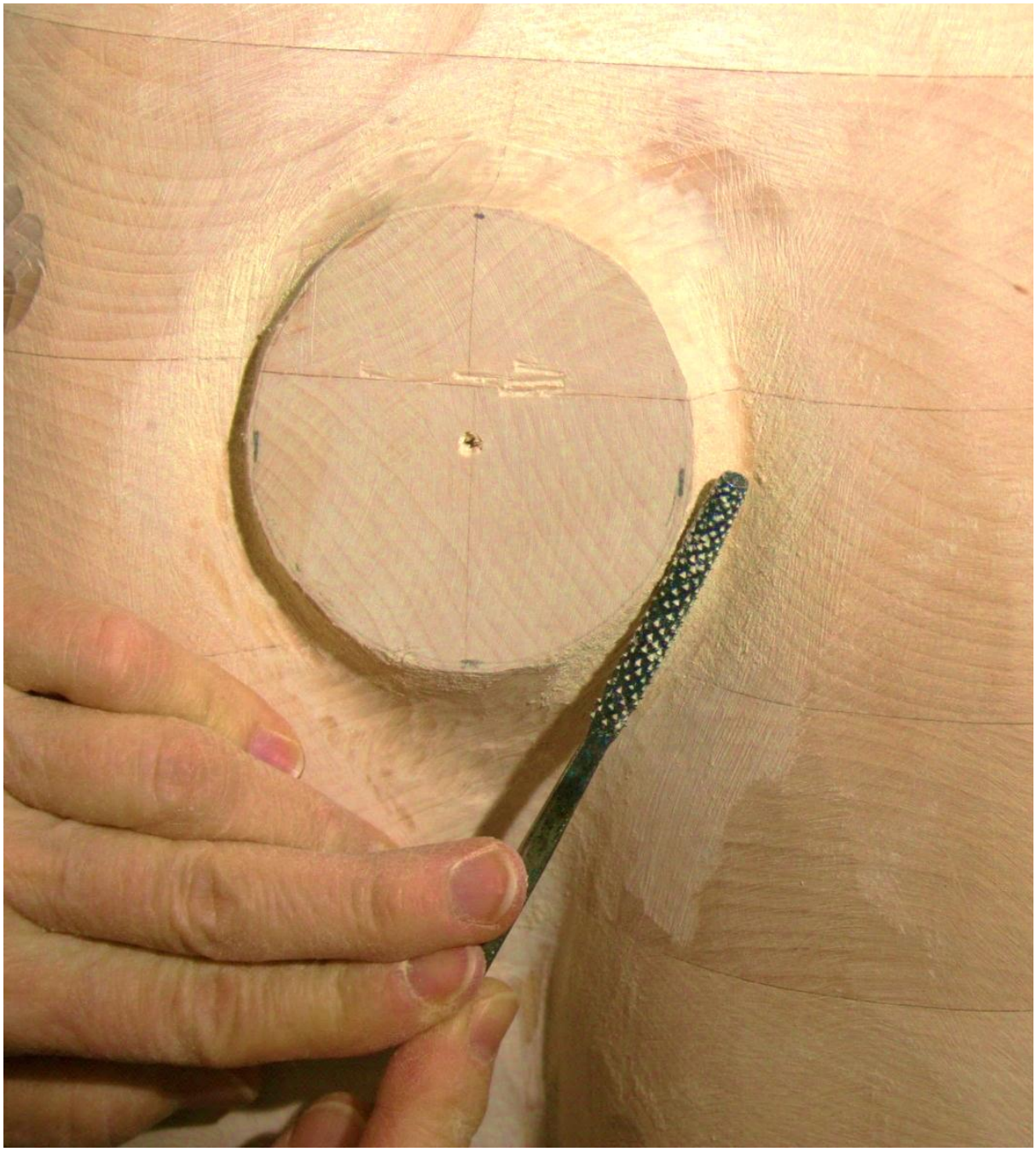
Chapter 6, picture 10b

The rump profile is finished first. Dividers mark the outer and inner circumference. The outer perimeter of the collar is being inscribed here. A second circle inside this will mark the hole.

Chapter 6, picture 10c

Refining the tail collar.

A round riffler trims the shape. Always complete the outside before cutting the hole.



Chapter 6, picture 11

Drilling the tail hole.

The initial hole is made with a large bit at a downward angle.

Chapter 6, picture 12

Enlarging the tail hole.

A large firmer gouge works well on the lower half. The upper part involves working against the grain and often requires a smaller gouge. Carver's gouges don't allow you to go too deep so part of this hole was finished from inside the torso. Slightly taper the hole for a wood tail to help shape the bung using carpenter's chalk. A hair tail fills up space and is less demanding.

CHAPTER 7

Making and Gluing Legs
Gluing the Cap
Fitting Brass Sleeves

LEGS

The legs are glued on after the trappings are carved. This is done before the cap/saddle assemblage is glued to the torso so the tops of the side panels can be used for leg clamp seats. The torso is put upside down so gravity works with you.

Legs that are made from two boards of equal thickness: The seam using two boards of equal thickness creates an inerasable central line which keeps the knees, fetlocks, and hooves aligned during rounding. Without a central line this is almost impossible. If you use a single board pencil a central line on the front and rear of the leg before carving.

Using two equal boards creates an easy lap face on bent legs. You can face glue wood with the grain going in different directions here because the area is small but use the stronger Titebond Original. When using only one board cut laps with a hand saw and flatten the faces with rifflers or use a dado blade on a table saw before carving.

The grain in laminations must be parallel. I prefer to match growth **rings** on the lower half of bent legs rather than have them opposing, especially if I can use the same board. Oppose the rings in the upper legs and on long, straight legs to minimize warping. Inside the elbow an extra piece of wood is usually added for realism and for a larger surface to glue to the torso. Orient the growth rings as shown in chapter five, diagram 11.

When laying the paper pattern over the lower half of a leg take into consideration the thinnest part, the pastern. Orient grain for strength here as much as possible. With legs that bend back kids step on them to get on the horse.

Important: Paper templates for legs will stretch and distort so use them only on the first piece of wood on a leg lamination. Trace the paper on the wood and ***mark a line on the paper indicating the grain underneath.*** When cutting the wood out leave a bit extra at the torso seam, sole, and a few millimeters in the profile.

As seen in picture one and two leave some wood tabs on the legs. Brads will be put there to prevent slippage without leaving nail tracks in the finished leg.

Place the paper on the second piece of wood, aligning grain, and lightly mark a few key places. Use these marks to place the ***wood*** leg already cut and trace around it. Cut the second piece a bit outside the pencil marks. A small slippage during glue up can significantly alter the profile of the leg. Duplicate the tabs on the second piece but make them stand out even higher. Notice in diagram nine where, with a little planning, these tabs can also be used for clamp seats when gluing the leg to the torso.

Lap shoulders must be flattened and squared *before* pieces are laminated together. Plan them so there is space to use the plane. Diagram 7. On bent legs the upper and lower parts are individually laminated before the full leg is glued up. It is much easier to carve the parts individually. Leave the knee area un-carved for the vise to grip. With the knee in a bench vise the rest of the leg section can be lifted above it for carving by placing a padded stick crossways underneath. (A flat surface at the knee will also be needed later for clamping the lap.)

A good inch of thickness at the seam surface on the torso connection should be left un-carved until hidden dowels are installed. This wood can often be used later as a clamp seat when gluing legs to body.

When gluing the upper and lower leg it is difficult to snug the lap shoulders tight. There are rarely good clamp seats and other clamps get in the way. Although a perfect joint is impossible try to get the pieces close. Since the strength comes from the overlapped faces that is the surface to concentrate on. Do **not** apply glue to the shoulders of the laps.

Note: Before gluing the upper and lower leg together round a tiny radius off the inside corners as shown in diagram 8. This keeps any trace of glue left during laminating from getting in the way.

After the glue is dry any small gap at the shoulders is fixed by cutting into the seam with a wide kerf saw. This makes an even space to fill with a wood shim. Fillers like Bondo tend to chip out. Make the shim a bit thin so you can apply glue to it. Coat it with Titebond and also slather glue into the gap with a long palette knife. Since the shoulder wood has no previous glue the Titebond will soak in well.

Stander Legs: Remember to use the first lamination, cut in wood, as a template for the second lamination.

Straight legs are easier to carve if they are placed at a slight angle to the grain. This avoids frequent changes in direction while carving, a real timesaver. It can also strengthen the pastern. You may have to glue extra wood at the toe and elbow. See diagram 1.

To keep stander toes from splitting some companies made very boxy hooves. For more realistic feet I have used ¼ inch aluminum plates with countersunk screws to protect them. On other figures I simply glued a separate piece of wood for the toe with the grain parallel to the floor. The small surface area makes the change in grain direction permissible but use Titebond Original. Diagram 2.

Standers have at least three legs with flat contact to the floor. As the seam with the torso is perfected it can slightly alter the angle the leg comes off the body. This changes how the hoof touches the floor. Correcting just the hoof bottoms makes feet that don't match, which looks awful. Contemporary reproductions don't know how to fix this which is why standers are often left hanging.

To solve the problem**, *when cutting out stander legs don't trim from mid cannon bone down yet.*** Lightly pencil the lower leg but leave the wood as shown in diagram 4. Go ahead and cut the soles of the feet according to the pattern, even though they will need fine tuning later.

Flattening All Upper Leg Seams

Trim and flatten upper seams before doing any carving. Belt sanders will round the edges so use hand planes. If you are dealing with end grain any chip outs that occur at the far edge often get trimmed away later. To prevent

chip out entirely you can temporarily glue a waste piece of wood to the far edge. A layer of newspaper between them will make later removal easier.

Hold the plane at an angle to the forward push so the blade makes a slicing cut, like using a knife on steak. Finish with a sanding block and 80-grit paper**.** Check contact with the torso using chalk. (Chalk will be easier to remove if put on surface grain.) Remember to inset the legs one inch. ***Extend registration lines from the leg sides across the finished surfaces***.

Thighs: Inside the rear legs thighs will need additional wood. Add it using panels with alternating growth rings. If you try adding individual pieces you can't tell how well the edges touch and dried glue is tedious to remove. If you need more than one lamination stagger the seams. Be sure the grain is parallel with the original leg.

Special note: When cutting steeply angled parts for a panel make them oversized. As you clean up the edges with a hand plane you will lose some of the profile as shown in diagram 10.

Using chalked plywood I flatten upper rear leg seams that will get a third lamination before the third layer is glued on. This is simply because my bench vise will not hold three thicknesses. After gluing the third piece the surface already flattened is a good guide for trimming the last panel. I clamp the leg to the side or top of my bench to work on the last piece. A final test with the torso is done with chalk. Don't forget to extend the registration marks from the sides across the finished surfaces.

On rear jumpers I will carve as much of the lower leg as possible while still only two thicknesses and easier to manipulate. With standers this must wait until the third panel is on and the upper seam/torso contact has been perfected. Like other legs leave an upper inch at the top un-carved for holding with dogs and used later for clamp seats. This also provides a larger area for seating the doweling jig.

The area between the rear legs is shaped like a 'U' and is made in the belly wood. Legs that touch in a 'V' would be impossible to carve. Because of the 'U' the thighs do not touch. How tight to make the space is a matter of personal preference and will determine how thick you make the thighs. Again, remember the legs will be inset an inch. The 'U' will be feathered to a 'V' on the rump.

Fitting hidden leg/torso dowels

A note on dowels: There is no need to apply glue to hidden dowels but their holes usually end up with glue in them. A hardware store dowel ***must*** have a channel cut down the side for glue to escape. Trapped glue absolutely will keep pieces apart no matter how much force is applied. Packaged cabinet-making dowels come with spirals to let the glue out. They also have more precise diameters.

Inset the legs an inch. (This is so easy to forget!). With a doweling jig resting on the torso make two holes for each leg about an inch deep. The holes must be absolutely perpendicular to the surface. A drill with a bubble will never be accurate enough.

Put a hole center-finder in ***one*** hole. Put the leg in place and transfer the mark with a thump. Drill the corresponding hole. Put a dowel in this hole and a center finder in the other. With the first dowel keeping the leg in position transfer the second mark, drill the second hole in the leg, and insert the other dowel.

During the dry fit be sure the legs can be pulled ***all the way*** to the torso. Slightly mismatched holes will not show until the final snugging is done and the pieces don't come together. You can rasp the side of a dowel that is slightly off but make a registration mark from it to the surface. It will be removed several times.

Perfecting the soles of standers: Have the torso upside down and remove the legs. The piece of wood for the belly/girth is not on yet so you have a large, flat surface across the bottom of the torso. Use a long level to be sure the belly surface is horizontal in both directions. Shims may be needed under the body if your sawhorses or floor are off. Dry fit the legs and place a large piece of ***flat*** cabinet grade plywood across the top of all the hooves. They will need a bit of tweaking to touch the plywood evenly. Trim the soles as shown in diagrams 5a and 5b until the plywood touches properly ***and is also level***.

Make a single hoof profile template from your large paper pattern and put it on each foot using the new bottoms for reference. Adjust the pasterns and fetlocks to look good, then band saw the final profiles. Any slight change in the length of the cannon bones won't be noticeable.

Tip: If you are not using metal shoes you can round the bottoms ***very*** slightly with a riffler to insure the center of the hoof touches while easing pressure at the edges.

Carving the Legs

Seams have been made perfect and hidden dowel holes installed. The profiles of the upper and lower parts of legs with laps are individually band sawed. Tabs not wanted for clamping to the body are trimmed off. Leave extra wood on the forearm at the torso seam for clamp seats later.

Looking from the ***front and rear***, draw the inner and outer contours in pencil on both the front and back of each leg. With a **hand** saw cut down to the lines at knee, ankle, coronary band, and cannon bone. Carving to the bottom of the saw kerfs will keep you centered, something that is very hard to do by eye once rounding begins. The saw cuts also allow you to quickly punch out hunks of material. Picture 3.

A lot of the leg carving can be done on the bench top, holding them with dogs. Scrap wood is notched to fit over the ends first and then seats are cut at the best angle for the dogs. ***Be careful not to over tighten the dogs.*** Too much force can split the leg. Pictures 4 and 5.

Tip: Carve and rasp all four legs before doing any sanding. That way if one leg ends up thin adjustments can be made to the others without wasting a lot of work.

On carousel horses the bottom of the hoof is only slightly wider than the coronary band. A real hoof would be wider but prone to chipping. The coronary band is the fat part above the hoof, not the line where the hoof meets the hair. Diagram 11. When carving the first one hold your hands behind it. This blocks out the background, making the shape easier to asses. Picture 6.

Reproduce the first coronary band by making a template using several pieces of Manila paper, getting the shape correct a section at a time and taping them together. This is much easier than trying to cut a single piece. Have extra paper on the Manila pieces for overlapping and taping them together. Keep a “C” marked on the center of both the template and wood. Trace the taped

assemblage onto one piece of Manila for a solid template. Remember to transfer the center mark and the back of the heels. Picture 7.

Caution: When carving the intersection where hoof meets hair (just below the coronary band) keep viewing from the side and front as it has a definite tendency to migrate. After carving one hoof create a template of the footprint to reproduce the others. Completely finish the outside of all the hooves before carving the soles.

Knees and hocks are traditionally simplified. I incorporate some tendons. Make them subtle or your horse will look skinned! Pictures 8 through 11. The flexor tendons behind the cannon bones are always carved but shape all four cannon bones before carving any tendons. This makes it much easier to match the leg shapes. Then pencil and carve the tendon grooves but keep them shallow and narrow at first to allow for corrections. Deepen and adjust them while continually checking from side and rear. Diagram 12.

On the hoof bottom the "frog" is a triangular shape with a groove on each side and another partway down the middle. Mark the frog in pencil while the bottom is still flat. Cut down on the lines using a sturdy chip knife. As the lines get carved away redraw them. Keep the knife straight so the cuts don't migrate. Pictures 12, 13, and 14. Of course only the heel needs to be carved on standing legs.

Tip: Sanding the legs with 80-grit paper is easier before attaching them. I often prime the pieces then as well. Don't be discouraged that priming the grain will rise and re-sanding will be necessary. Sanding the primer goes much quicker. Eighty-grit is fine enough for paint or horses that will be left raw. Finer paper is used only when a deep spot is hard to reach. Leave the seam areas roughed out and unprimed since they won't be finish-carved until after glue up. Priming is covered in chapter 9 but I will mention here to use **Kilz**. It is much easier to sand than BIN.

The inside of the thighs is difficult to reach once the legs are glued on. Do as much work as possible while they are dry-fit with hidden dowels and friction fit nails so they can be removed to work on.

Gluing Legs

Most of the trappings have been carved, the cap is still removable. Once the legs dry fit correctly they are removed and the wood for the belly/girth is glued on and the pole hole extended through it. This is covered in chapter six.

It can be hard to clamp legs. Bar clamps with deep throats can accommodate the inset. They can run from tabs or hooked under temporary screws on the legs to the top of the side panels. Tabs left on legs with vertical grain will just snap off unless they are reinforced with screws first. Diagrams 13 and 14.

For something stiffer than screws dowels can be glued in holes to protrude from the sides. For enough length and a smooth fit use hardware store dowels. Take a scrap of wood with a hole drilled in it to the store to get the best dowels. They are far from standard in diameter. See dowels used in diagram 16. Remember screws or dowels will have to be long enough to accommodate the inset.

Since these clamps only apply pressure at the outer edge they are used in conjunction with band clamps to add other vectors. Careful dry testing is essential. The band clamps can be hooked over temporary screws in the bench or sawhorse sides ***as long as the animal is securely fixed to them first***. Otherwise the figure will simply roll as you tighten the bands.

An alternative to clamps: Legs can also be secured with lag screws and washers either from inside the torso or from underneath. Diagram 15. I drill the hole for the socket wrench first. Countersink the head enough for a good layer of Bondo to cover it but leave enough wood under the head of the screw so it won't simply pop through. If the hole is deep you can use a scrap of wood to take up some of the space when packing with Bondo later.

The leg needs to be *tightly snugged* before drilling through the seam. Otherwise the hole will flex the seam apart later. Drill from the center of the socket hole using a long bit to make a hole your screw will grab. (Lamp making suppliers offer long bits.). Remove the leg and enlarge the hole only in the entry piece so the screw can slide in easily. The hole in the other piece must stay smaller so the screw will grip, pulling the pieces together.

Straight front legs

The hardest leg to glue is the straight front leg on a stander. It has a small, end-grain area with no easy clamp seats. I use multiple band clamps along with long screws or dowels from the sides and hand-screw clamps. Refer to diagram 16.

On the end grain thin Titebond Original to pea soup consistency, adding about 20% water. Apply the mix to the end grain until it will take no more. Scrape off the goo and apply full strength glue to both surfaces. Wait about two minutes and clamp.

You might think of screwing this leg from inside the torso but screws do not grip well in end grain. It is also very hard to snug the leg to the torso before drilling the hole. I strongly suggest using exterior dowels or screws with hand screws, bar clamps, and strap clamps.

Gluing slanted front legs: The upper part of slanted legs is prone to breaking. Leave extra wood on the leg in this area and carve it down later. See diagram 17.

Rose had one extended leg and the other one glued to the belly. To make the extended one stronger I tried something new. I made the forearm out of the torso side panel and lower pancakes. It worked well but since the leg wood was not inset one inch a lot had to be carved off the outside. The knee lap had to be made with a hand saw and files.

Gluing the Cap

With the legs and belly/girth wood glued and carved roll the horse upright. If using a saw horse be careful not to knock the legs on the stretchers. I needed only one wide sawhorse for Rose but I had to lower the stretchers to clear the legs. If the legs still get in the way (standers usually do) I use two parallel sawhorses and place a 2” x 12” board across them. Make the board long enough to roll the figure between them. This eliminates interference with the stretchers altogether and provide working space. If the animal’s legs are too long and hit the ground put spacer blocks under the board.

When you have decided where you will be placing the figure on the long board or sawhorse drill a through-hole below the pole hole. If the horse is

on a wide sawhorse further stabilize it by drilling another hole directly below the pole holes through plywood attached to the stretchers. A pipe clamp can then be run through the horse and the two holes.

With the horse upright glue the cap by changing the four friction-fit nails to lag screws and washers. These and a pipe clamp through the pole holes and board or sawhorse top apply the pressure.

Attaching the neck

The head/neck is glued on last, usually with band clamps. Although hidden dowel holes are already made I retest the surface with chalk, applying it to surface-grain rather than end grain. I have never had any final tweaking change the surface enough to create problems with the dowels. In a pinch they could be shortened to small nubs. Their only use is to keep the neck registered correctly on the torso.

Mask off the torso with tape and newspaper to keep chalk dust out of carved areas since they will be hard to clean. It also keeps dribbled glue out of your trappings. Notice on Rose in picture 20 much of the figure was sanded, primed, and re-sanded while it was still in parts.

A stable connection to the sawhorse or board is absolutely necessary. Place scrap wedges under the animal and run a few band clamps around the torso/ work surface. Keep the pipe clamp through the torso in place to further stabilize it.

Trimming the pole holes for brass sleeves

With the neck glued turn the horse on its side. If it seems tippy place an additional padded 2x4 under the neck. Run the three foot pipe through the torso. (Now you will appreciate making a beveled cone inside the holes.) Cover the top with a brass sleeve for a final check of the mane clearance.

The upper brass on both jumpers and standers is slightly inset into the body for a finished look. The top of the hole must be opened a bit. (This is impossible to do after the animal is on its stand.) With the brass over the pipe trace the area to be trimmed out. Remove the pipe and brass and enlarge the pole opening a deep as is needed. I use a Dremel and sanding disk.

The lower brass on a stander can go in as far as you wish so there is some mercy in cutting its length. You can tape the legs back on your full sized paper template for a height estimate. Just be sure to open the lower hole enough to accommodate the brass's diameter. The brass will sit on top of the plumbing flange which adds some height.

Jumpers are held up with a through-hole in the pipe and a ½ inch diameter pin. A large washer goes over the pin to distribute pressure and protect the paint. Rose's washer was 4 inches across. The pin should be about 7 inches long, with a 5 inch straight section and two inches at the end that is slightly bent down.

The bend makes it easier to remove the pin and prevents it from sliding all the way through the pipe. Less than a 5 inch straight section might accidentally slip out while moving the figure. That would not be a happy moment. I have a machinist drill the hole and make the pin and washer.

To mark the pin through-hole location put the washer on the five foot pipe and run it into the figure. Be sure the pipe is screwed all the way into the flange. If the washer overlaps the girth a small crescent can be cut out of the strap now. Since the belly itself is slightly curved the washer may not have perfect contact but it will not noticeable so far underneath the animal.

For jumper height refer to the notes made when the full sized pattern was on the wall. Mark the hole locations just below the washer. (This can be done simply by backing the pipe out a bit and wrapping masking tape around it at the top of the hole locations.) Mark the tape with an arrow so the machinist knows on which side of it to drill. Be sure he knows the pin must go directly through the center of the pipe.

I like to screw the plumbing flange on the stand as shown in chapter 10, diagram three. However it is much more important the pin ends up going ***side to side*** or it will run into the girth. It is OK to rotate the pipe/flange assembly before attaching it to the base to correct the pin orientation.

The length of brass is determined with the holes drilled and the pipe is out of the horse. The sleeve must end just below the top of the pin so the pin bears the washer rather than the brass. Slide the brass down from the top. Be sure it is seated fully against the plumbing flange. I order my jumper brass to

correct length but it can be trimmed with a hacksaw. This can shift and leave scratches. Since the lower end of the brass will be covered by a decorative flange cut that end.

The other end must have ‘U’s cut for the pin. I use a Dremel and sanding drum. See picture 3 in chapter 10. To determine where to cut the ‘U’s slide the brass over the pipe. The brass will cover the pin holes so first extend their location upward on the pipe. Put masking tape on the pipe above the holes and use a magic marker vertically. To fine tune the brass repeatedly slide it a little past the top of the pole to work on. If you lean the pole on a box so the top isn’t so high makes the work easier.

Keep the figure on its side. (Once the figure is mounted on its base cutting the plumbing pipe will be impossible.) With the 5 foot pipe slid back in determine how much to cut off the top of the pipe by sliding the upper brass over it. (Since there are no pin holes in standers the pipe must be marked underneath to show how far it slides into the horse.) Decorative brass caps that go on top of the pipe have a tang that slides **into** the sleeve**.** ***Cut the pipe shorter*** than the sleeve or it will interfere with the tang. There is no need for a close fit here. If you forget to do this it would be easier to just order a longer piece of brass.

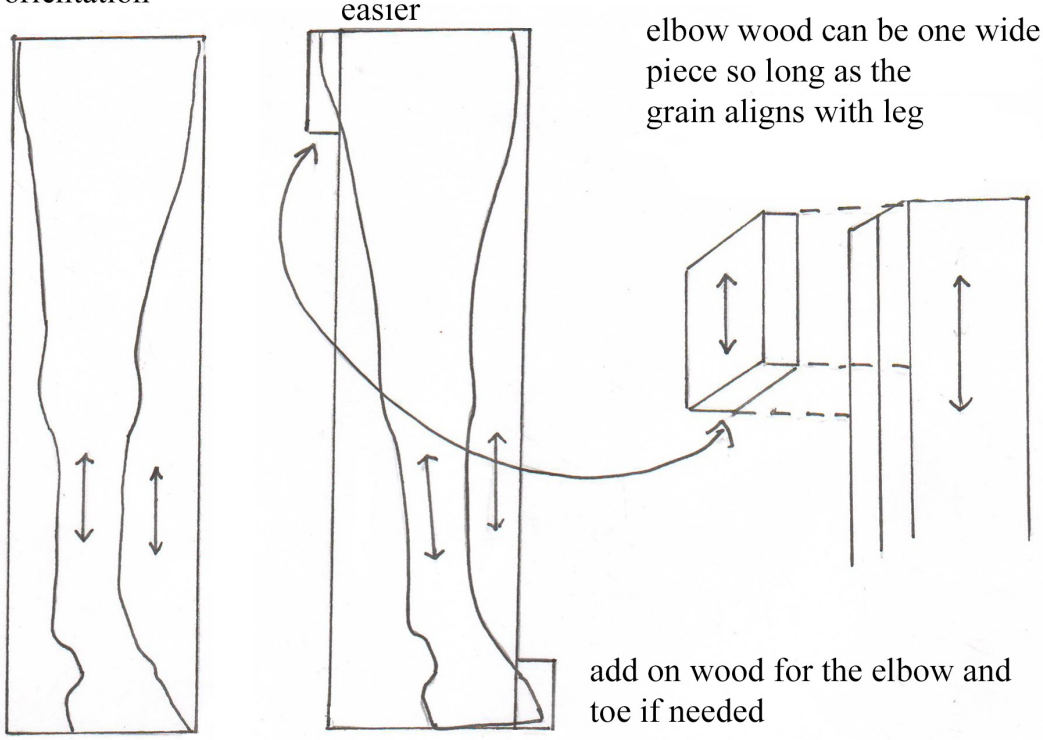
Chapter 7, dia. 1

Laying Out Legs on Boards

not the best grain orientation

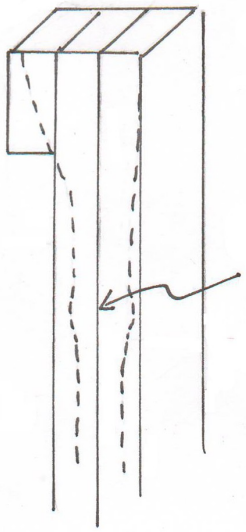
angling the grain from the leg makes carving easier

elbow wood can be one wide piece so long as the grain aligns with leg



add on wood for the elbow and toe if needed

upper leg, rear view

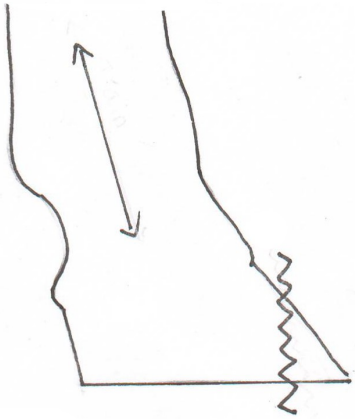


extra wood is added inside the upper leg, an additional piece may be glued across the back for the elbow

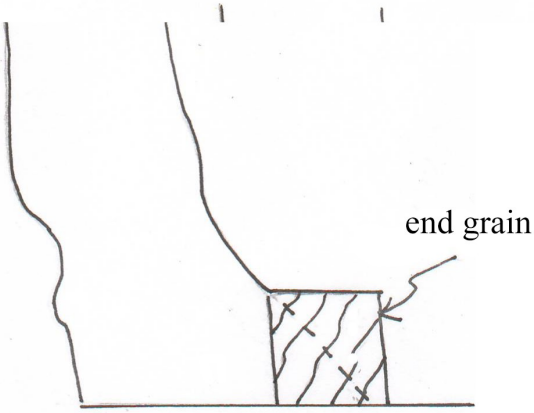
center seam on leg

Chapter 7, dia. 2

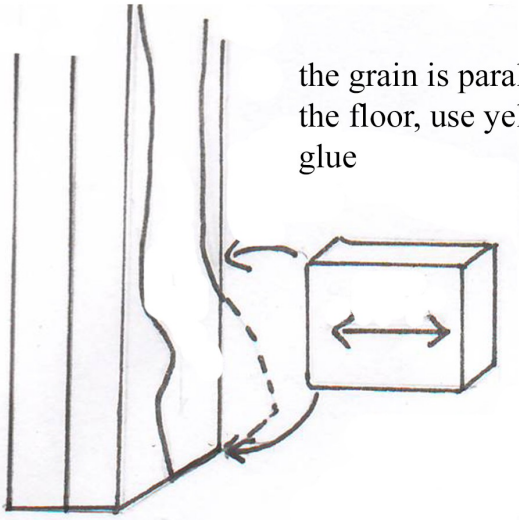
Fixes for Toes Chipping Off



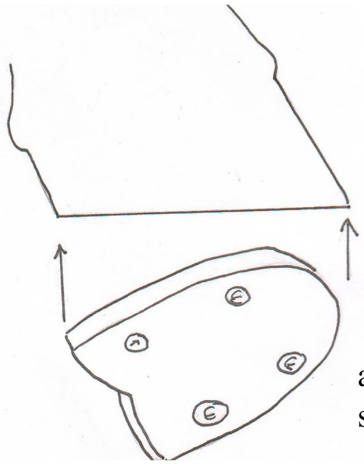
with this grain orientation the toe will want to break off



the tip can be cut off and a piece added with grain parrallel to the floor



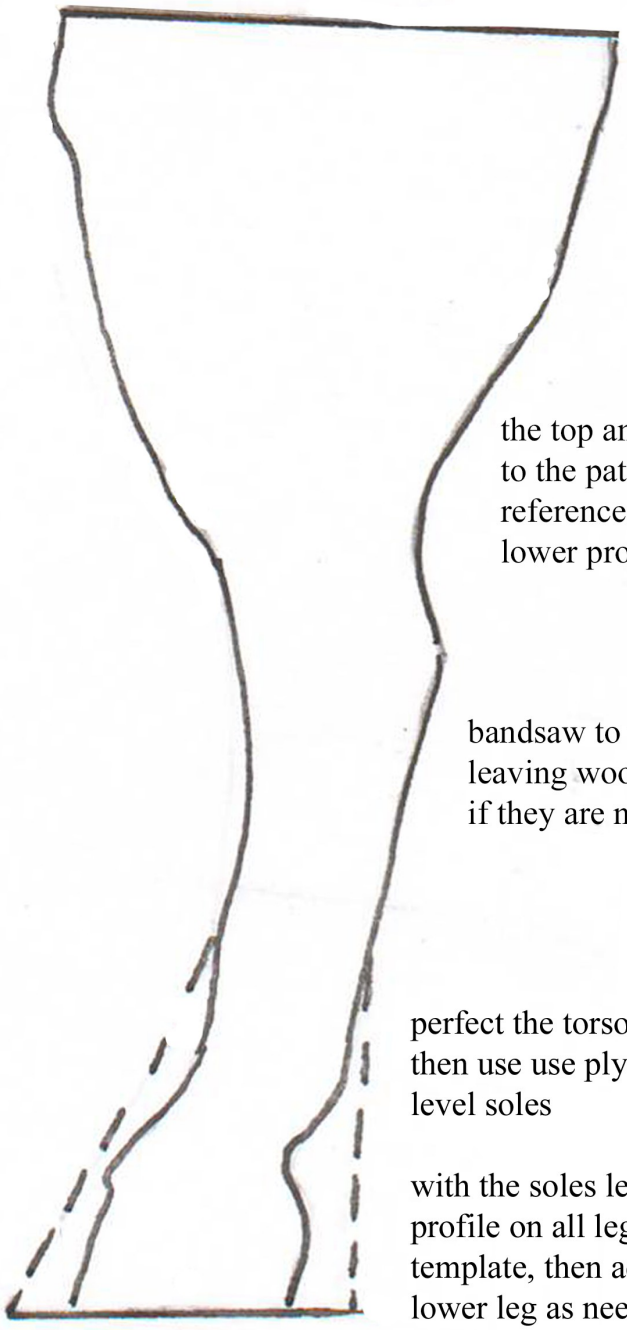
the grain is parallel to the floor, use yellow glue



another option is to have aluminium shoes made with countersunk screws

Chapter 7, dia. 4

Cutting Out Stander Leg



the top and sole are cut to the pattern to provide reference but the lower profile is left uncut

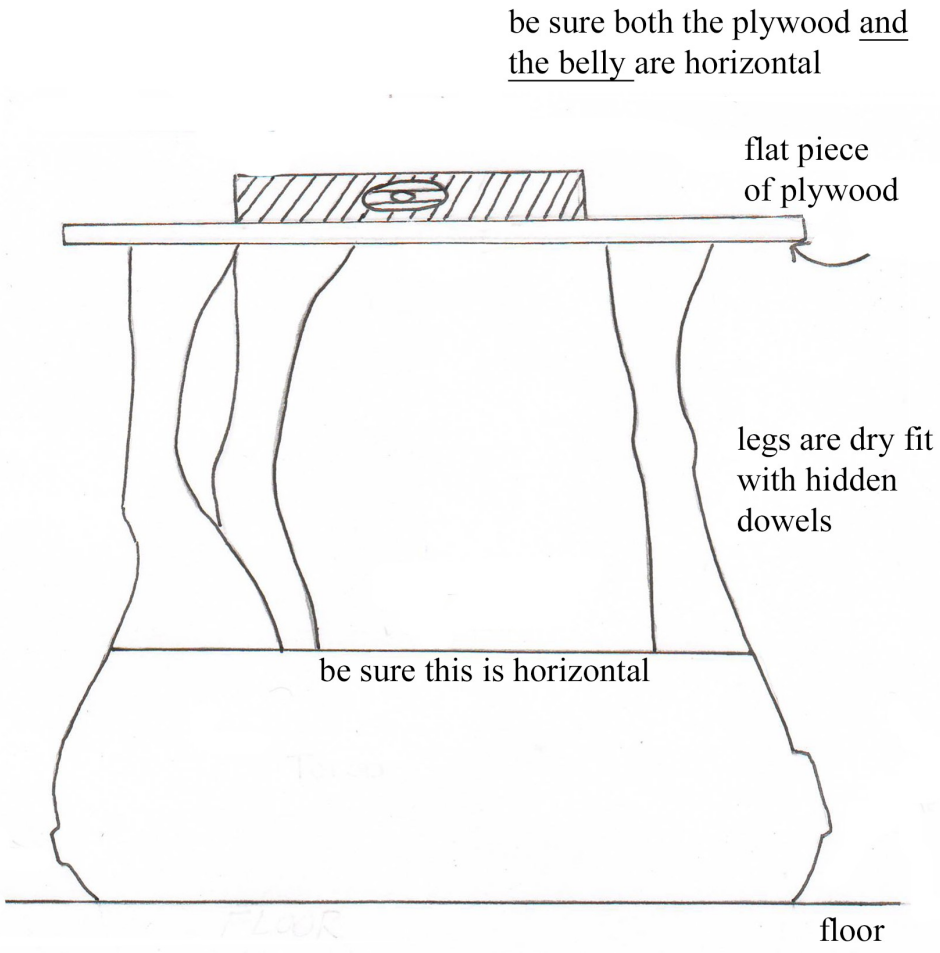
bandsaw to the dotted lines, leaving wood for alterations if they are needed

perfect the torso attachments, then use use plywood to level soles

with the soles leveled cut the hoof profile on all legs using a sturdy template, then adjust the rest of the lower leg as needed

Chapter 7, dia. 5a

Checking Stander Hoof Bottoms

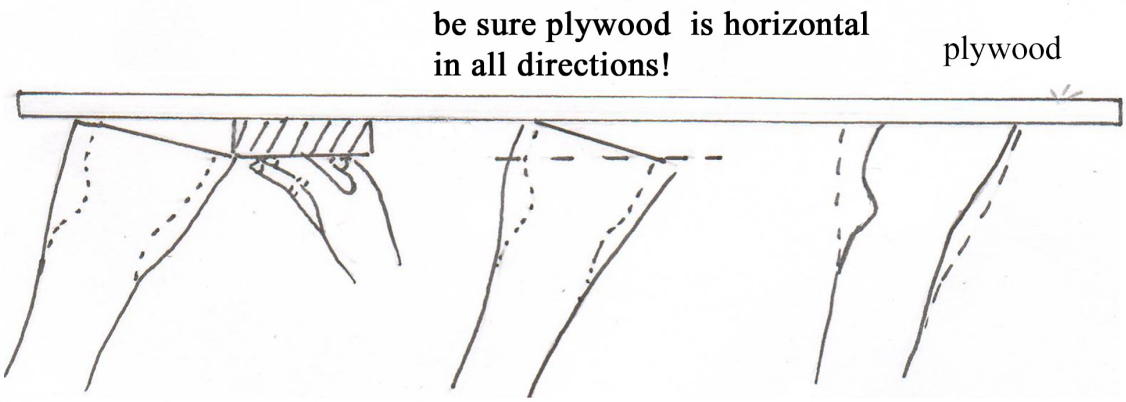

be sure both the plywood and the belly are horizontal
flat piece of plywood
legs are dry fit with hidden dowels
be sure this is horizontal
floor

Chapter 7, dia. 5b

Evening Stander Legs

torso is upside down with plywood resting on top

(angle is exaggerated)



hold scrap equal to gap of greatest thickness

use the scrap to trace a line around all legs

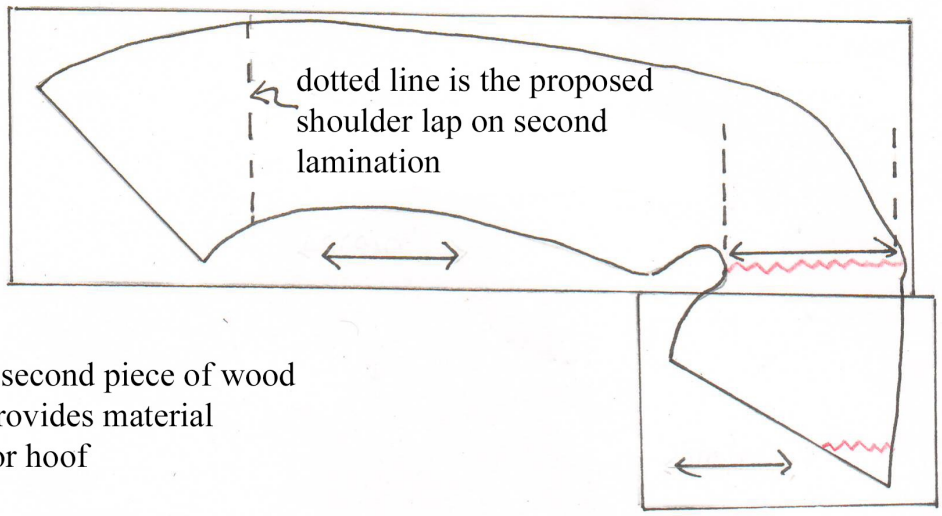
trim soles and redraw new hoof profiles

cut the rest of the leg to new profile

Chapter 7, dia. 6

Layout of Lower Front Leg

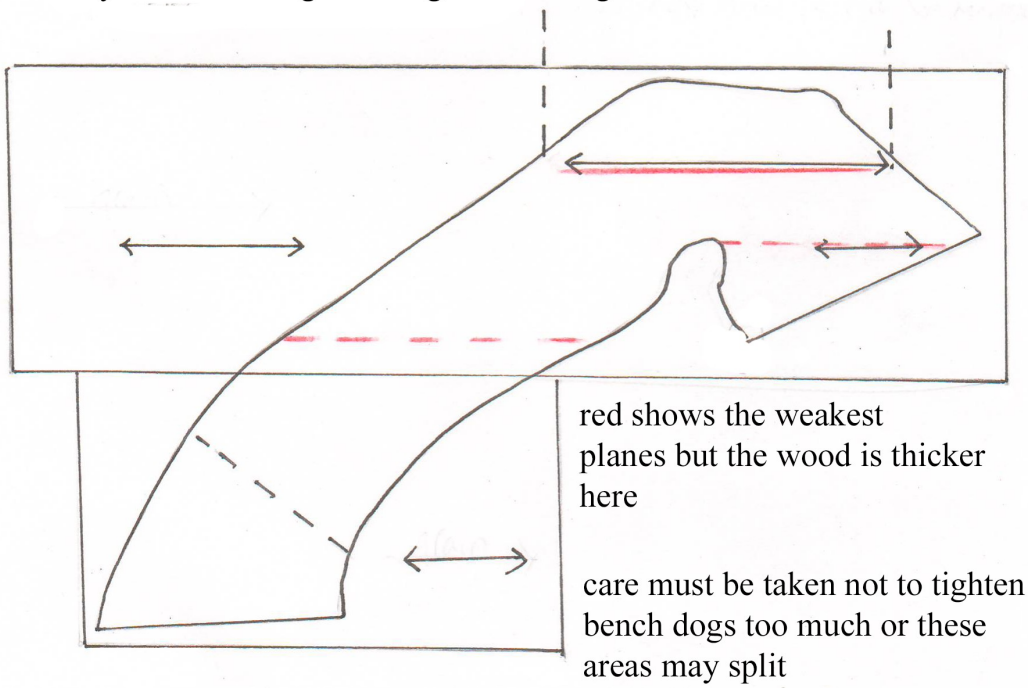
here the grain runs through the weakest area, the thin pastern



a second piece of wood provides material for hoof

red lines are areas that will want to break

this layout shifts the grain for greater strength



red shows the weakest planes but the wood is thicker here

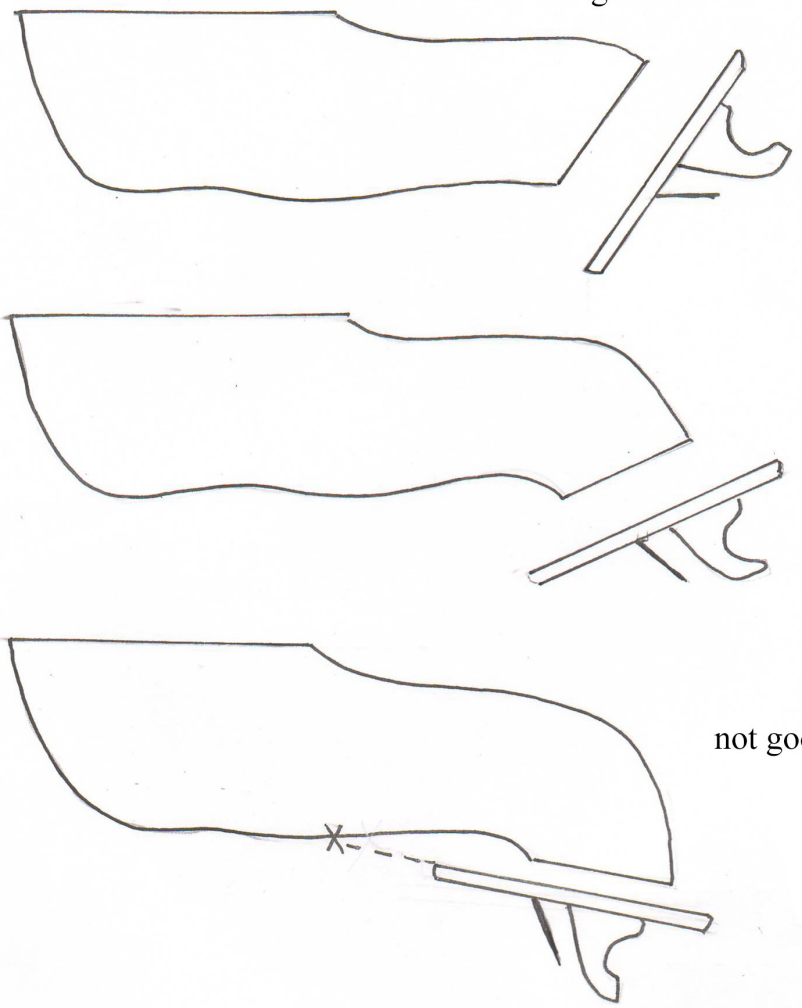
care must be taken not to tighten bench dogs too much or these areas may split

Chapter 7, dia. 7

Laying Out Lap Joints on Knees

lap shoulders are squared before any laminating

the angle must be layed out so the plane won't run into the leg



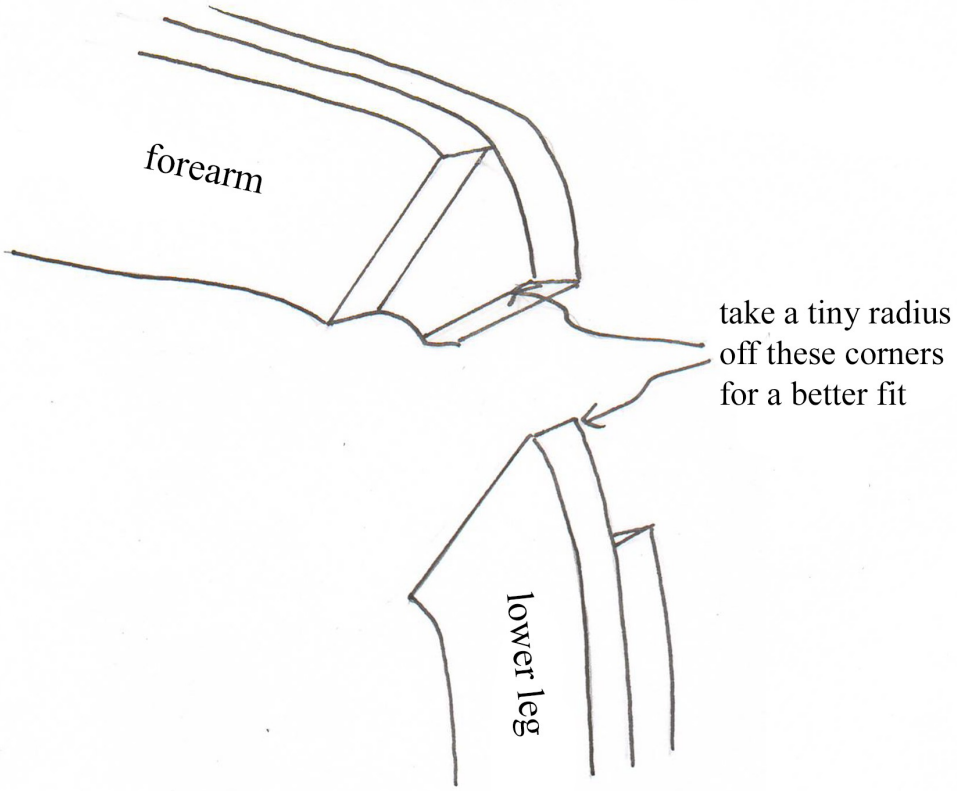
OK

OK

not good

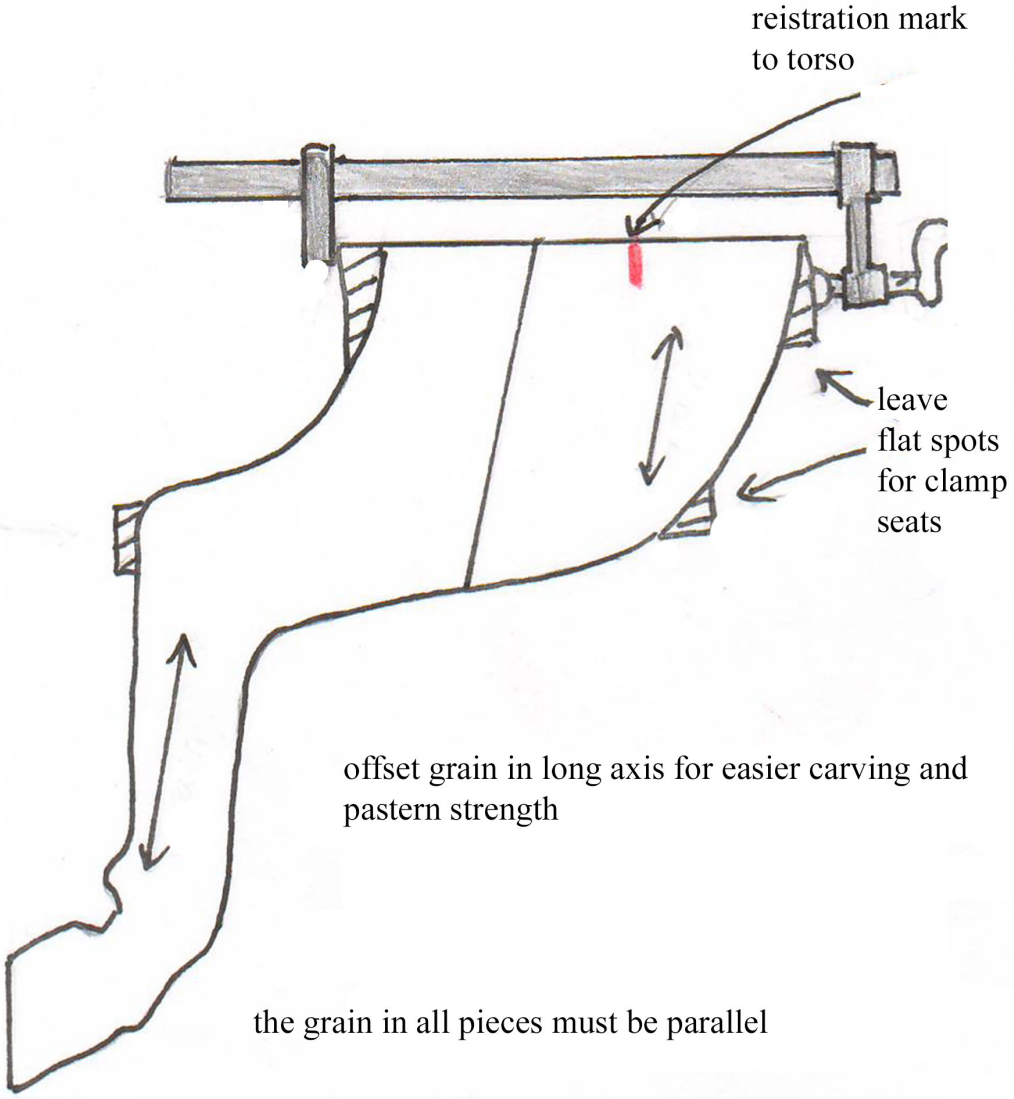
Chapter 7, dia. 8

Lap Joint at Knee



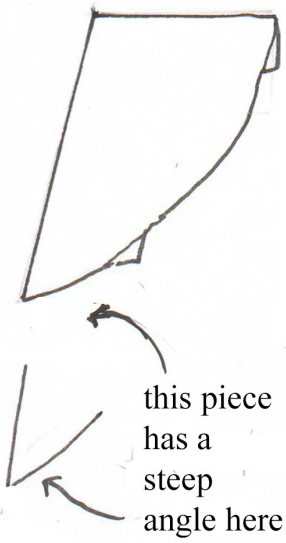
Chapter 7, dia. 9

Building a Rear Leg

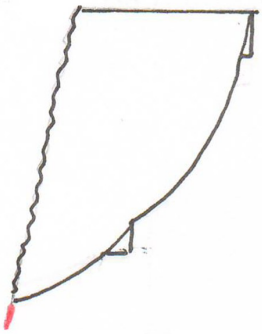


Chapter 7, dia. 10

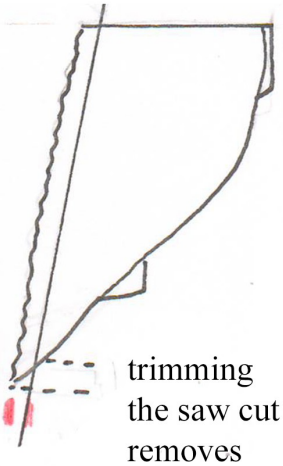
A Note on Cutting Out Pieces With Steep Angles



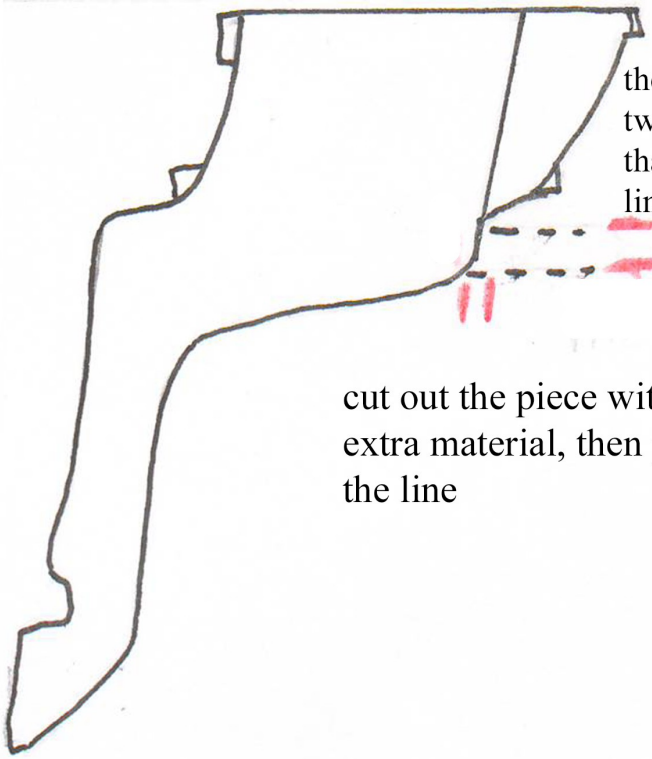
this piece has a steep angle here



the saw cut is rough and needs planing



trimming the saw cut removes some of the length

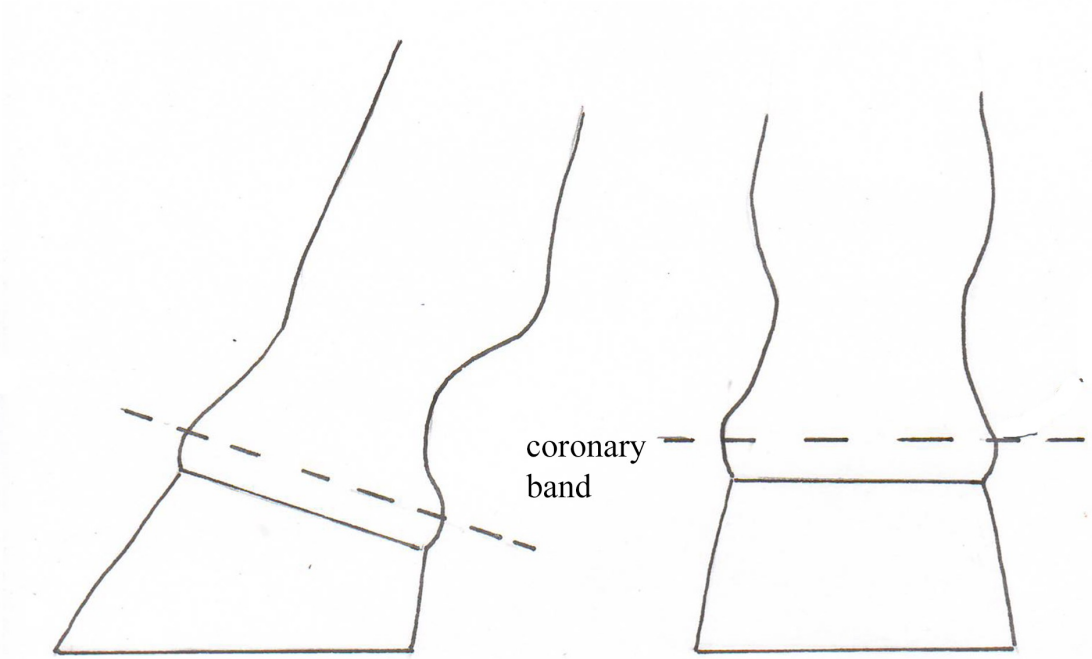


the result is two pieces that don't line up

cut out the piece with a little extra material, then plane to the line

Chapter 7, dia.11

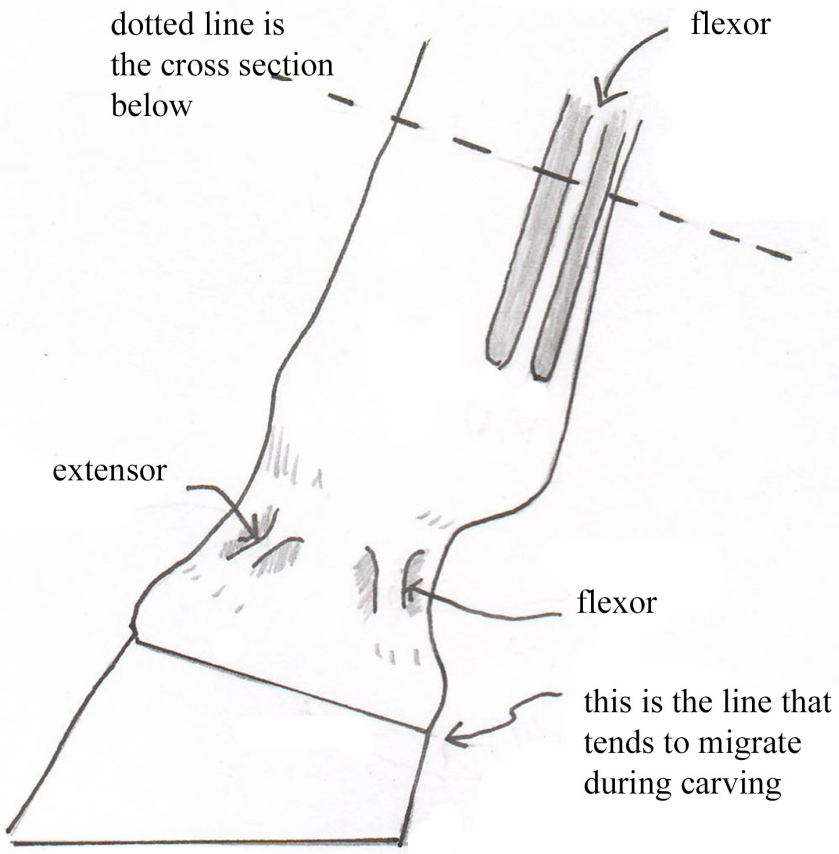
The Coronary Band



Chapter 7, dia. 12

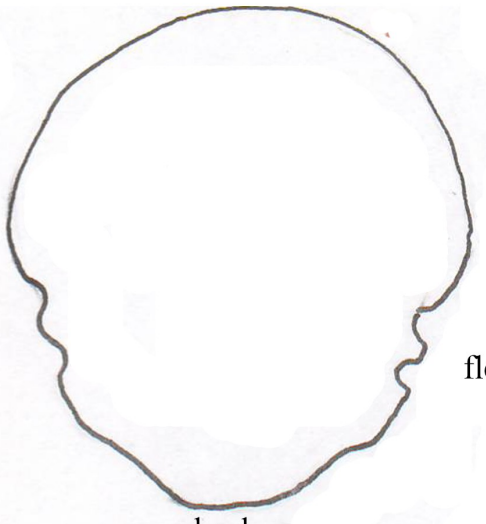
Shaping the Lower Leg

d



cross section of cannon bone

front



Chapter 7, dia. 13

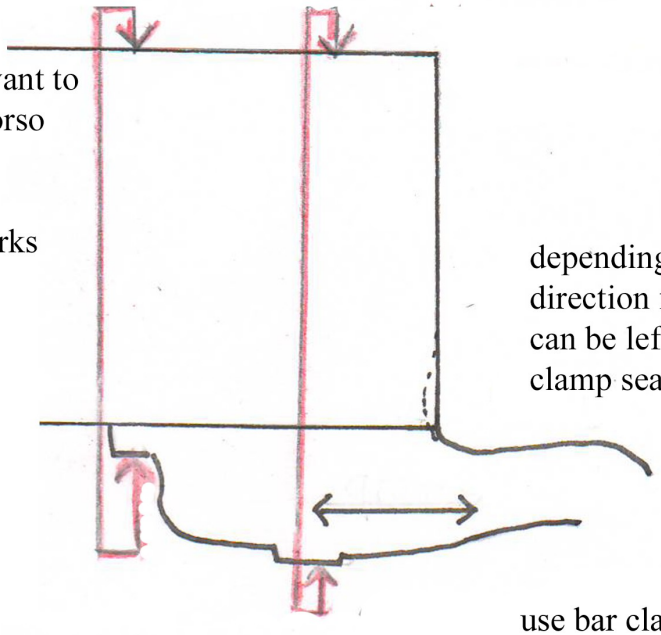
Some Clamping Ideas on Legs

the cap is removed, providing nice clamp seats for legs

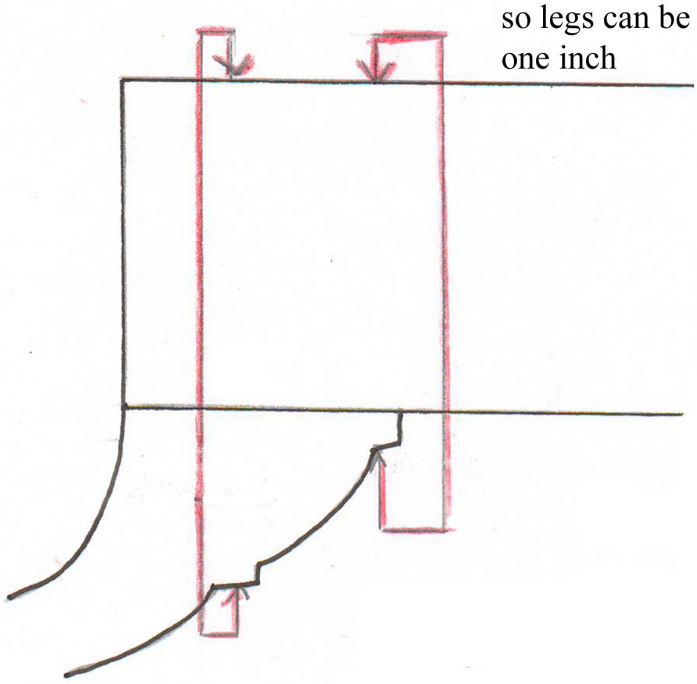
you will probably want to glue legs with the torso upside down

this way gravity works with you

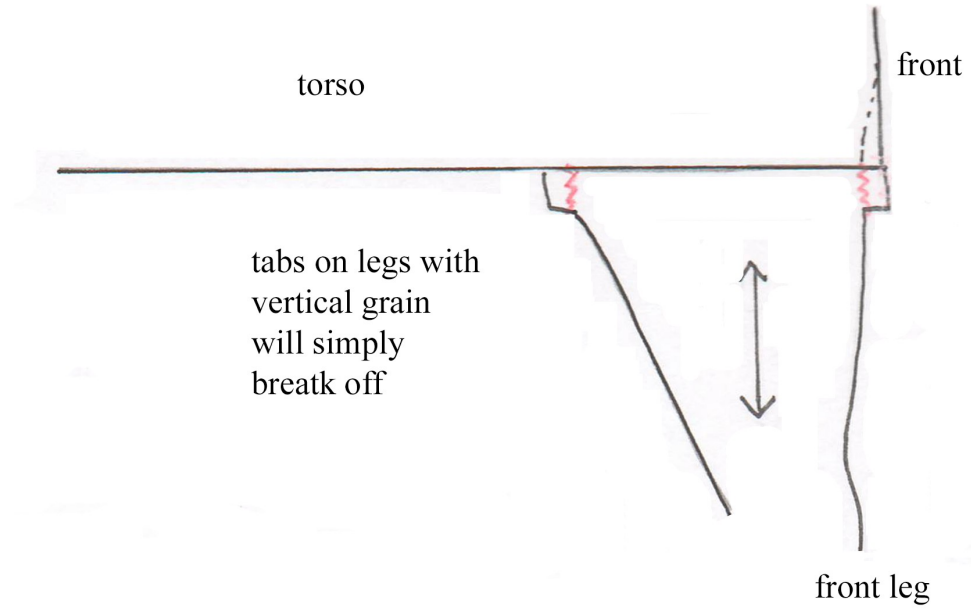
depending on grain direction flat areas can be left for useful clamp seats

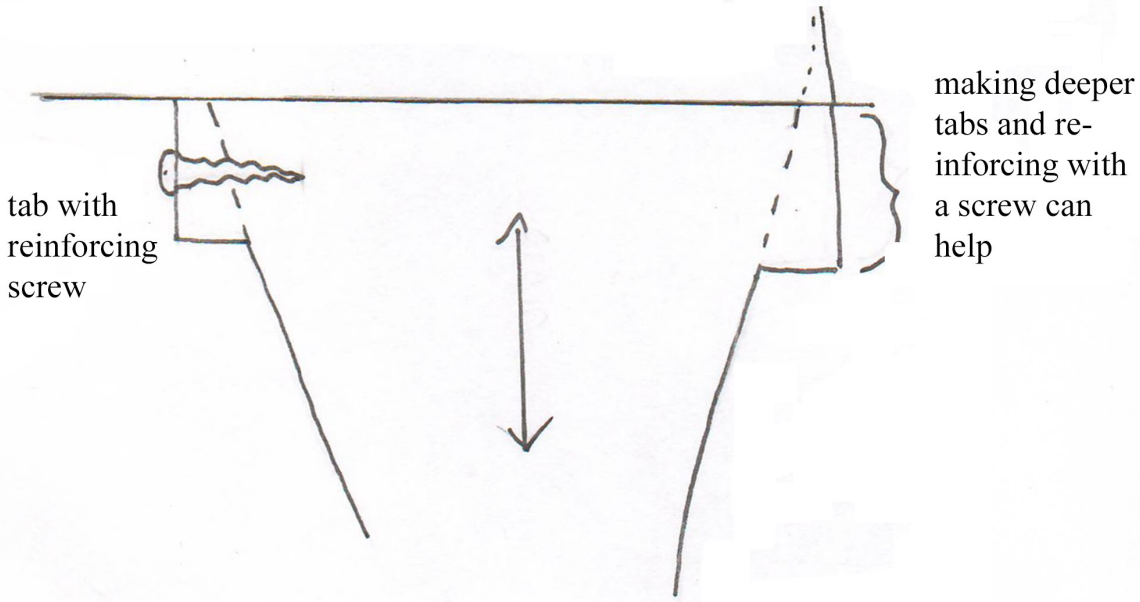


use bar clamps that have deep throats so legs can be inset one inch



Using Tabs on Legs with Vertical Grain





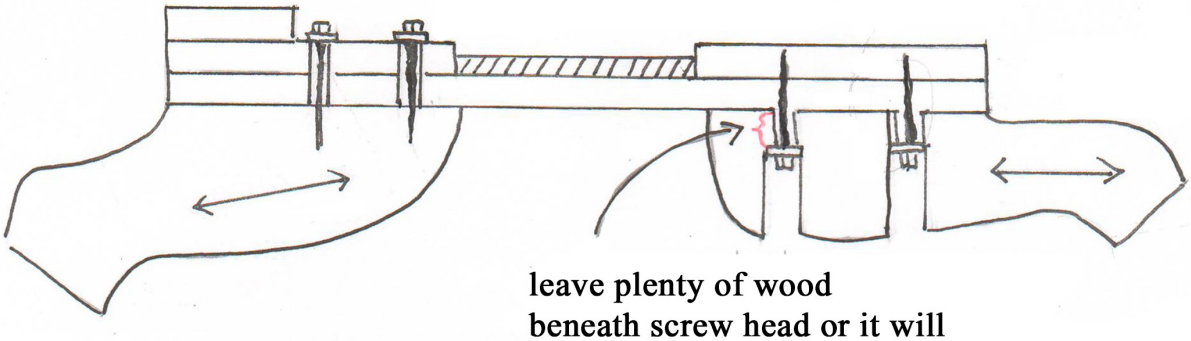
Chapter 7, dia. 15

Options for Attaching Legs

fasteners can be left in place after glue up

lag screw and washer, screw must pass easily through first hole

here screws are run from underneath and go into belly and pancake piees



leave plenty of wood beneath screw head or it will break out

make hole large enough for a socket wrench

Chapter 7, dia. 16

Some Clamping Arrangements

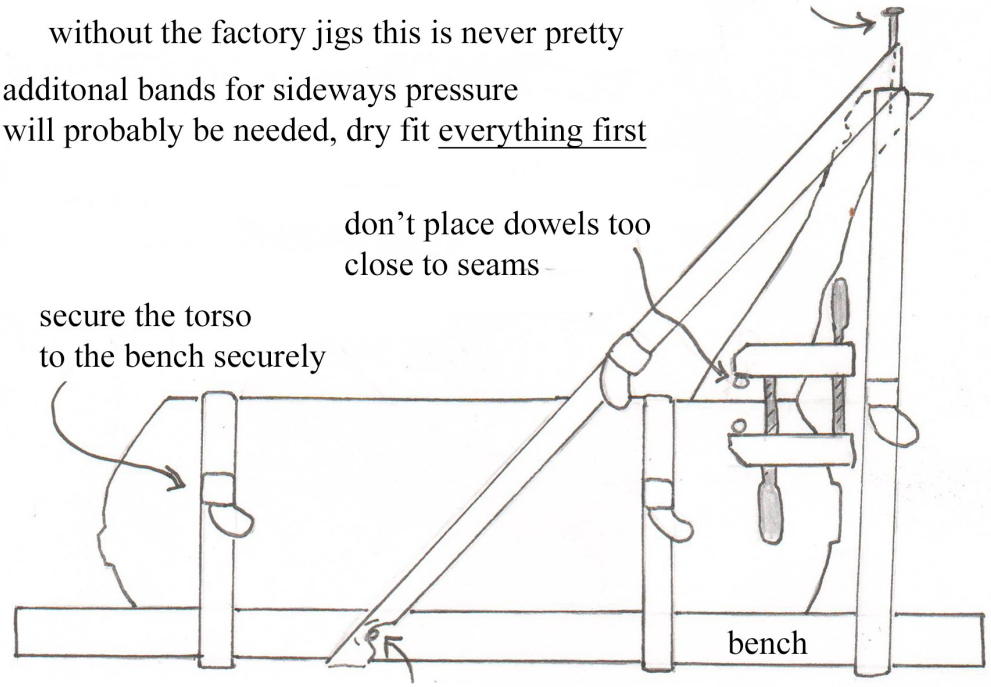
temporary screw to
hold band clamp,
watch for split out!

without the factory jigs this is never pretty

additonal bands for sideways pressure
will probably be needed, dry fit <u>everything first</u>

don't place dowels too
close to seams

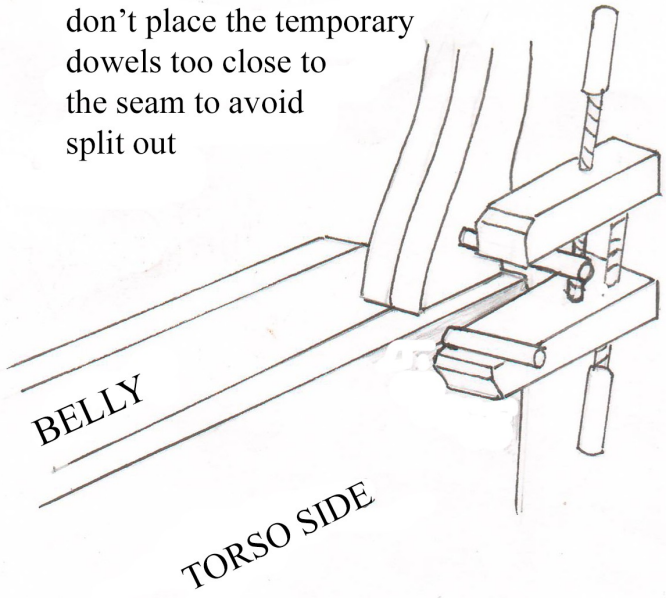
secure the torso
to the bench securely



temporary screw

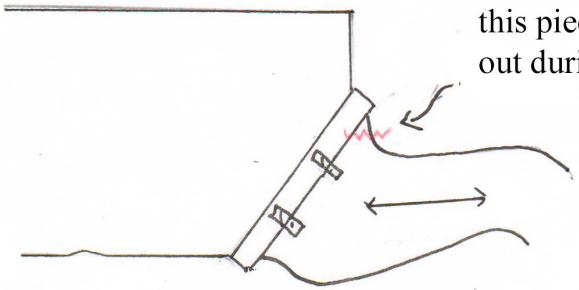
don't place the temporary
dowels too close to
the seam to avoid
split out

using a hand screw
can accomodate
the leg's inset

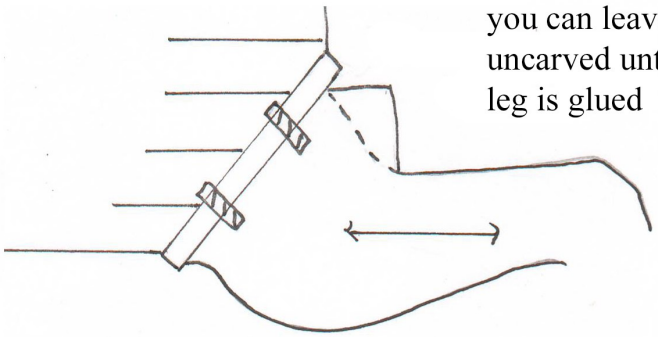


Chapter 7, dia. 17

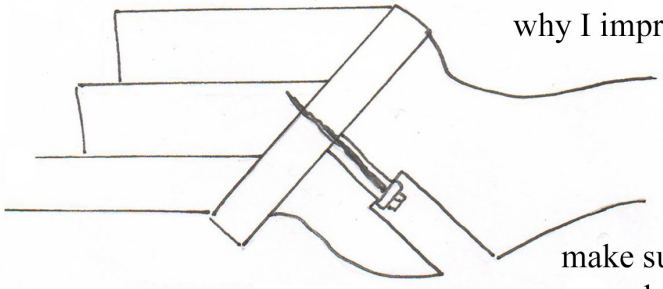
Attaching Front Leg on Slanted Surface



this piece will be prone to break out during glue up



you can leave extra wood uncarved until after the leg is glued



even with an intermediate panel this is never a strong joint, that's why I improvised on Rose

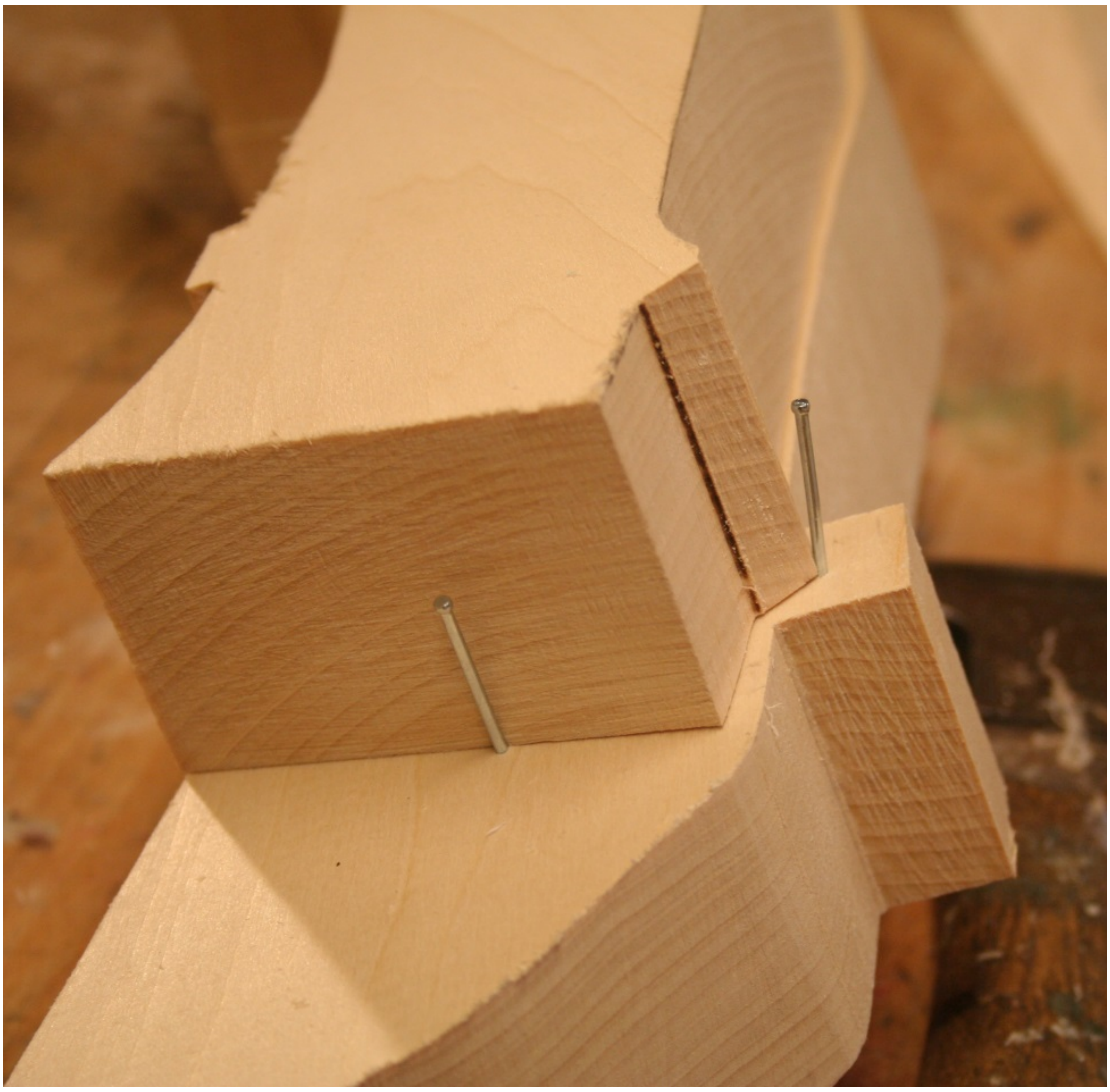
make sure outer hole is large enough for the socket wrench

here a fastner is run from underneath but hidden dowels and several band clamps are often more practical

Chapter 7, picture 1

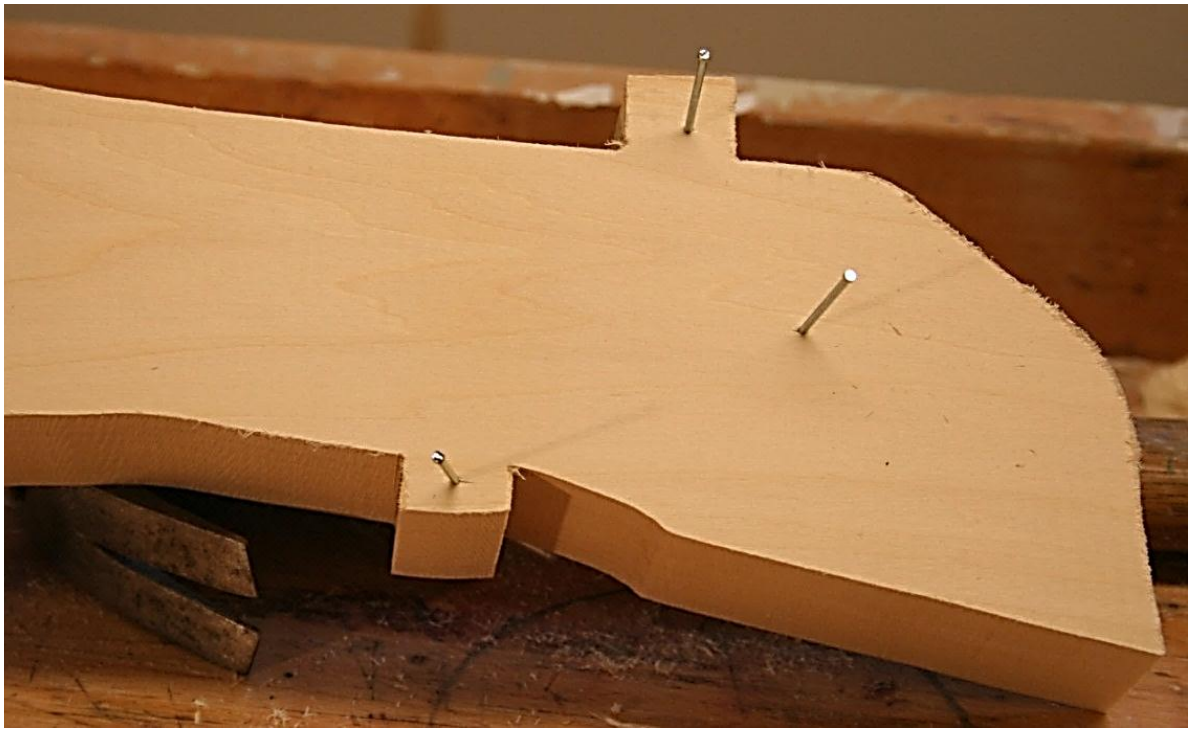
This is the knee of a lower leg. Since paper templates can flex the first half is cut with the template and then that piece of wood is used to trace the second half, which you can see is made a little wider.

On this dry fit, one half is longer to make a lap joint. The shoulders of lap joints must be made flat and square **before** the pieces are glued together. Notice the raised tabs to place brads.



Chapter 7, picture 2

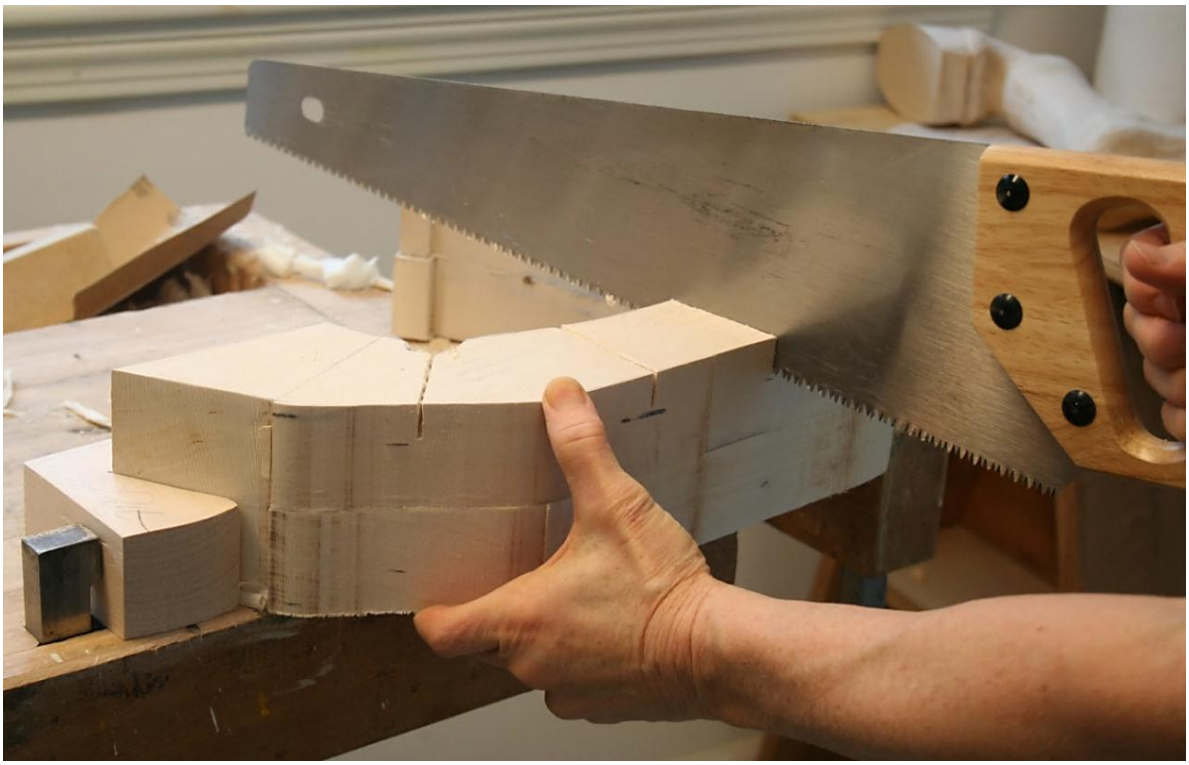
The first half of a laminated lower leg. You can just make out the penciled lap line.



Chapter 7, picture 3

Cutting the leg to width.

The halves have been glued together and band sawed. Pencil marks on the front and back delineate width at key spots. Cut straight across them. The kerfs become valuable reference points as the leg is rounded. Carving is much easier to do before the pieces are put together so I cut kerfs before the upper leg is glued to it.



Chapter 7, picture 4

Holding onto a leg with bench dogs.

The leg is held with two scraps cut to fit. Do not close the clamp too hard! I've left squared off areas on the leg for clamp seats when attaching the leg to the torso.

Chapter 7, picture 5

Detail holding a leg in bench dogs.

Chapter 7, picture 6

Checking the first coronary band

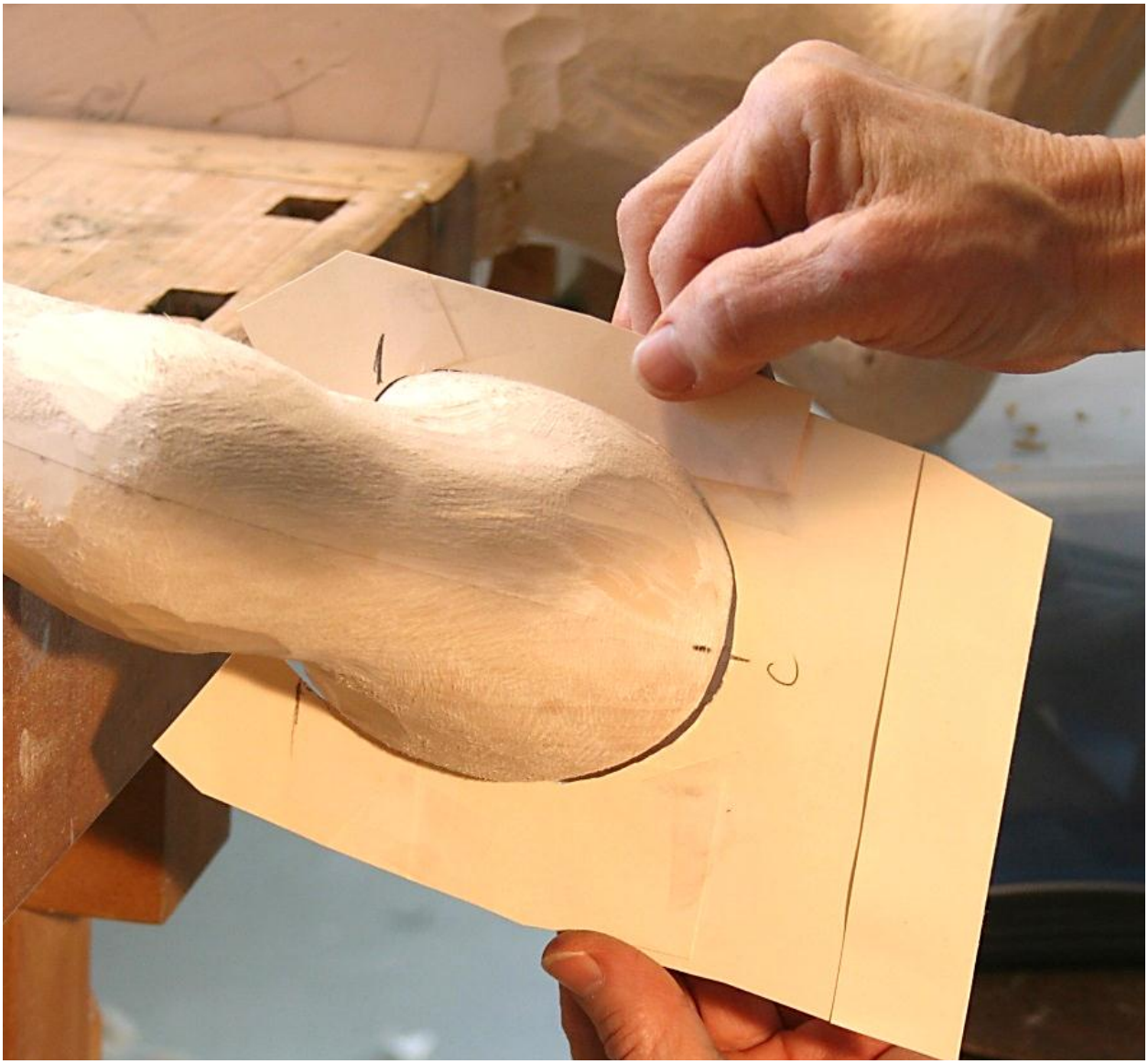
.

It’s helpful to block out the background with your hands.

Chapter 7, picture 7

Making a template for coronary bands.

After the first coronary band is finished a center mark is made on the wood. It is easier to work in sections of Manila paper. Leave paper to overlap them and apply tape, then trace the assemblage onto a solid sheet. Be sure to transfer the center mark and heels to the template. Note the marks indicating the back of the heel.



Chapter 7, picture 8

Carving a rear leg.

Even without the inner thigh panel the bench vise cannot keep the leg from shifting during carving. A stool and plastic bin support the hock. Notice the piece left for a clamp seat later.

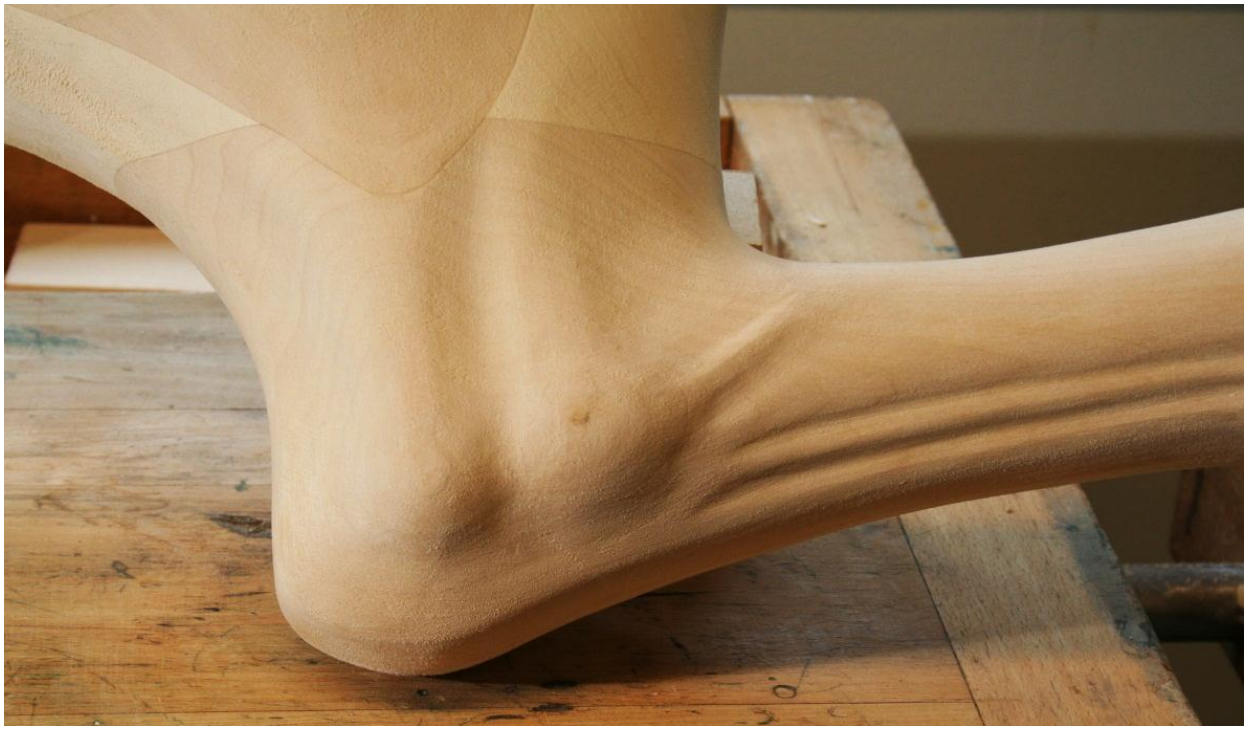
Chapter 7, picture 9

Shaping the hock.

"X"s are placed on both sides at the highest spots. View them from the rear as well as the sides to keep them even. To photograph it the leg is just resting on the vise here. For carving it was held by its sides.

Chapter 7, picture 10

The finished hock.



Chapter 7, picture 11

Finished hock, rear view. The friction fit nail later held the leg on the torso while shaping the upper leg.

Chapter 7 picture 12

The hoof bottom is penciled in from a template. The lines are cut straight down as carving proceeds to keep them from migrating. The knee was left un-carved for the vise to get a good grip and for clamping the leg together later.

Chapter 7, picture 13

Carving the hoof bottom.

The outer wall of ***all*** hooves are completed first. Sole depth is done by eye. Do not begin sanding before all four are done in case you have to go back to get them to match. (Pencil marks delineate the tip of the frog.)

Chapter 7, picture 14

A finished hoof bottom.

The small split-out will be fixed with Bondo before priming.

Chapter 7, picture 15 Dry fitting legs on the torso.

More of the leg carving was done with the horse upright. Legs are inset one inch but still only dry fit. Tabs were left near the seam for clamping to the torso later. Notice the extended reference marks from side to belly.

Chapter 7, picture 16

Shaping a leg to the torso.

The leg is dry fit with hidden dowels. Most of the carving is done before they are glued on. The “U” shape has been made in the belly wood. I use tape on my hand to protect from rubbing.

Chapter 7, picture 17

Continued shaping of the leg.

The torso is right side up now, with a corner hanging off the saw horse. The leg is still dry fit. Blocks and wedges hold it up. A friction fit nail at the back helps.

Chapter 7, picture 18

More leg shaping.

Chapter 7, picture 19 Dry fitting a rear leg.

To carve as much as possible while the leg was dry fit a nail anchored this band clamp which was wrapped around the saw horse. Dry dowels were in place across the seam. (More band clamps were used during gluing.)

Chapter 6, picture 20 Clamping Rose's neck

A pipe clamp through the pole holes and sawhorse anchor the body solidly. Newspaper and tape kept testing chalk and glue drips out of the torso details. A lot of priming and sanding is done while the horse is still in pieces. Traces of the old stain job can be seen along the neck seam. It will be trimmed off later.

CHAPTER 8

Tips on Carving Trappings and Tails

I do most of my carving before the legs and head are glued on. Carving tools tend to undercut as you go down. When working on details begin outside the line until you get close to the desired depth. Then final-trim. Do not go too far down with the initial cuts or they will show on the background as stab marks.

Tip: When carving into the surface it is helpful to leave some places untouched to see how deep you've gone.

Adding Laminations

Carve areas not needing laminations before adding on wood. Laminations get in the way when creating the lower relief details. On Rose the simple flowers and all the leaves and stems were carved before wood was added for the raised roses.

Laminations must have grain aligned with the wood underneath. To make a pattern place acetate over the torso and trace the shape with a felt pen. Note which side is up, it can be hard to tell later. (Do I have to tell you not to use an X or an A?) Indicate the grain orientation on the acetate. Cut out the new wood leaving extra for slippage. Do not carve it until it is glued so you have a flat surface for the clamps. Laminations are best with the growth rings pointing upward at the edges.

To clamp hard-to-reach laminations you can use screws with washers but this leaves holes. I place long scraps of wood over the laminations and run clamps from them to similar scraps screwed under my wide saw horse or workbench. (The figure has to be firmly wedged in place first.)

See picture 43 where I am adding wood for roses. Pressure is adjusted by side-viewing how the scrap is sitting on the top piece. Keep the laminations in place with temporary brads.

Tip: It is easier to fill nail holes if they are put in a convex surface rather than placed in a depression.

Tassels and Fringes

Remember that it is the cords that maintain continuity, not the spaces between them. Tiny files are very helpful. To save time where the tassel strings intersect with something, carvers would fade the grooves to a flat surface. This can be seen in chapter 4, picture 12. Feathering eliminates trimming out the convolutions at the intersections. On some commissions I have had to trim out grooves right to the interface, a tedious process.

If the wood is too soft to hold closely parallel ridges apply shellac thinned with about 30% alcohol and let it set to stiffen the wood. Don't let it puddle as it will be hard to sand later. ***Always*** proof your shellac on scrap wood first! Old product will not cure.

Coins

If coins are not going to lie flat make the plane of the face before marking out the circumference. If you draw a circle and then cut the face at an angle the coin will be oval.

Straps

Finish one edge of a strap completely. Only then measure to the other edge. Picture 1. If you are using carpenter's chisels put the flat face against the strap. Keep both hands on the tool and one wrist on the wood. Orient the tool to make a slicing action rather than stabbing straight down. This reduces tearing on end grain and the flat surface of the tool helps keep the cut straight. Picture 2.

If a strap line or some other element starts "drifting" out of place during carving you can often ignore where it is and begin future cuts where you intended them to be. Carving frequently ends up deeper than you think and the upper mistakes get removed.

Blankets

When making a blanket first decide how much body you want "the fabric" to be. The thinner it is the more crisp the folds are. You might try draping some actual fabric on the animal and photographing it for reference.

Rose was fully blanketed and it was challenging to "see" the horse underneath. I marked the paper template at hip points and shoulder lines and transferred these to the wood with colored pencils. Even with some rounding done the template can be laid over the torso to keep referencing trappings. To repeatedly overlay your template you ***must mark the wood with an "X"*** where the pins first go in. The pin holes themselves leave no trace. Place them in areas that will not get carved, like lamination sites. Reinforce the paper with a few layers of clear tape to keep the pin shafts from tearing it.

Vary the angle and "wavelength" of the folds and make them tighter at one end for more visual energy. Usually the crests and troughs are straight and flat along their length. Using rifflers in the direction of the folds helps. Strong side lighting is a must. See pictures 3 through 7.

With a raised boarder it is easier to maintain the fold pattern if you shape the whole blanket first and later cut down the wood around the raised area. With the folds carved and rasped mark the raised boarder. It is not necessary to cut the whole blanket away. Cutting a shallow angle from the original blanket surface to the edge of the boarder will look flat from a distance. Multiple "layers" of trappings on a fairly thin panel of wood can be created using this optical illusion. See picture 10.

Notice in picture 11 the marks on the overlying girth. These were for reference to preserve the integrity of a basket weave pattern when continuing forward on the blanket. Later I changed it to easier puckers. Pictures 12 and 13 show the puckers on Rose. Pictures 14a and 14b show the layout on an earlier horse.

Buckles

Buckles are challenging because there is no fudge factor. Diagram one illustrates two kinds of buckles used on real horses. The tang must be centered and the strap must maintain an even width and thickness. Flatten three of the buckle faces, (the forth has the tang), but leave the center raised because the strap goes up over a cross bar underneath. Chip carving tools work well to cut the strap inside the buckle. I prefer them over X-acto knives because the blades are stiffer. See pictures 15 through 21.

Bolster pillows

With bolster pillows the overall pillow shape is made first, then the recessed rings are carved. Finally gathers are made by alternating long, shallow depressions with shorter, steeper ones near the rings. Pictures 22 through 25.

Armor Plate

Scales can be drawn onto the sides from the template but on the chest and rump use a single Manila pattern piece to trace each scale. Get the body completely shaped and sanded before laying them out. Keep the placement of scales consistent under overlying elements. (Armor plate is very tedious to make.)

The Cherub on Rose Horse

In designing this I had a few key considerations. Both the location and roundness of the head would draw extra attention. Because I didn't want "a melon" hanging there I had to be careful not to make it too big. Secondly, a baby can only flex at certain places (unless you're trying to get one into a snowsuit!). I wanted the arms down the side, grasping a rose bud, and the body on top of the rump. This meant the shoulders had to end up at the junction of the top and side of the animal.

First I made a rough clay model on a Breyer horse to play with the body position and proportions. Eyes were made 50% larger than normal. Carved eyes are static and lose visual energy. They will appear too small if done to accurate size. Then I made a better maquette using a clay carousel rump, which is narrower than a real horse.

A center line was drawn on both the clay model and wood torso for reference. Measuring the clay rump width and dividing the wooden rump by it provided a ratio for enlarging cherub body parts. Reference pictures 26 through 30.

So that I could easily refer to the model while carving I put it on a rolling hospital tray-table. I use the same tray for keeping often-used tools handy.

Tip: When working with non-drying clay wear shoes dedicated to the shop. Pieces will get into the treads and you don't want this stuff in your carpet.

While carving the cherub I left the right wing off to help get the torso correct. Once the body was carved I created a non-drying clay model of the right wing directly on the wood. It was made in a half folded position to prevent it from being

pulled on after carving. To hold the clay in place two nails with large heads were temporarily driven into the wood far enough to be below the surface of the clay when modeling. Feathers on one wing were traced onto acetate as a guide for the second one. Picture 30c.

With the wing modeled registration marks were made from the wood body to the clay. Then I traced where the clay contacted the wood before removing it carefully. I had to flatten the area to add wood for the wing. The penciled outline showed me the minimum area to be removed. This had to be enlarged somewhat to create a flat surface. A little wood in the torso around the wing needed to be removed but was simply re-carved from the new wood.

Gouges, files, and a scraper were used to create the surface. Final flatness was tested with a scrap of dusted wood that just fit into the cut out area. Small gaps at the edges of the new piece with the cherub were later filled with Bondo. Picture 30d.

Since the attachment surface was small I allowed the wing grain to be at right angles to the cherub's body, horizontal when viewed from the rear of the horse. As with all end grain I soaked the cherub body with thinned Titebond Original first. Picture 30e.

To clamp the wing I used two pan head screws. Remember holes in the laminated piece must be large enough for the screws to slide easily or they won't work as a clamp. Later I filled the holes with Bondo. Picture 30f.

The Cherub Face

The face was going to be made from wood laminated onto the side of the horse. I first made the face in non-drying clay right on the torso. Picture 30a and 30b. Putting a center line on the finished clay was imperative. After making reference marks from the clay to the torso I carefully lifted it off. With the same procedure used on the coronary bands I made a Manila template of the profile. The sides were traced by placing the clay on a sheet of Manila paper. After wood was laminated the templates and clay model were very useful guides.

Carving was done after wood was glued to the horse. The head was the size of a lemon, making eye and lip details about as fine as basswood will allow. I could

have applied thinned shellac to toughen the wood but ended up not needing it. Details should not be made from Bondo. It doesn't move like wood and will eventually fall off.

The Tail

All tails are removable to facilitate painting and later repairs. The downward hole allows a screw to run from between the legs to keep it in place.

Tanned tails are a lot less work than carved ones and are available online. (I avoid **salt-cured** tails since they attract moisture and don't do well in humid situations.) The end has leather which is tacked around a dowel. At the scale I typically work the dowel is 1¼ inch diameter and about 8 inches long. Some of the leather along the sides if the tail may need to be trimmed away. Extending the dowel beyond the leather inside the horse provides length needed for the screw between the legs. The final fit is less exacting than a wood tail since the hair takes up any gap.

Making a Wood Tail

The tail on Hunter began with the full sized paper template. To make a three dimensional maquette from the flat template I held the rough clay model at arm's length with the full sized paper template at a distance beyond. This way they appeared the same size. Then I fine-tuned the clay, further defining the tendrils. Picture 31. Translating it to the wood blank was fairly easy to do by eye.

Note: Be sure the hair is carved in the same direction on both sides.

For strength the tail grain has to be parallel to the hole in the torso. To determine this I put a scrap of wood in the hole, taped the paper template to it, and traced the stick orientation onto the paper. (The stick was quite long because I wanted it for something later.) Pictures 32 and 33.

Because the tail blank ends up very heavy fit the piece that goes into the torso before laminating the rest of the wood to it. Picture 34. The bung and the hole should be tapered. This makes it possible to shape the bung using chalk in the hole. The bung should be a fairly close fit but it doesn't need to be super tight since it will never be glued. Once it is in its final position the contact seam with the torso can be perfected. Later, when running the screw, hold the tail in place so the screw doesn't pull the tail into a new position.

With the bung shaped the rest of the tail is laminated and roughed out with a Lancelot bit and 5 inch sanding disks on a drill. Picture 36. Picture 37 shows Hunter's tail just about complete.

Piping

This is the shallow channel parallel to strap and saddle edges. It adds visual kick and provides an opportunity for more colors. Don't put it in until the wood is sanded to 80-grit. This is a case you must sand before carving.

Piping should stay the same width and be evenly spaced from the edge. I start by drawing the edge-ward margin of the channel in pencil. Begin with a narrower veiner than the final channel and make a very light cut inside the line. *Gently* butt the end of the tool with your hand in tiny, repetitive motions, keeping your tool hand resting on the wood. Never use a mallet on parting tools or veiners. This puts too much force on their small surfaces and the edges will crumble. I then deepen and fine-tune the channel using a tiny riffler with a rounded end.

In cases where the piping is straight a carpenter's chisel can be used to notch out a 'V' that is narrower and shallower than the piping and then fine-tuned with a tiny riffler. Sand the groove with 120-grit paper, folding it tightly so it won't round the upper edges of the channel. Pictures 38 and 39.

Flowers

Antique figures had a range of styles. Spend time looking at old animals for inspiration. On Rose I used three types of flowers. When placing them I kept in mind that each type would have its own color. I did switch some of them so the final color pattern would be more pleasing.

About roses: Roses are very difficult. Many things must be kept in mind and they need a lot of tools. The roses on Rose were made from laminations. Several roses were done from one long lamination to avoid seams. I shaped all the convex crowns with varied heights and angles before beginning any petals. See picture 44.

First decide where the middle of the flower is. This may not be in the center if the blossoms butt against something. Shape the crowns and lay out all the petals of each flower before carving to insure there is enough wood for the outermost ones.

I begin carving at the center. On Rose two petals defined the hole, other rows had three petals. Stagger where the petals overlap. See picture 45.

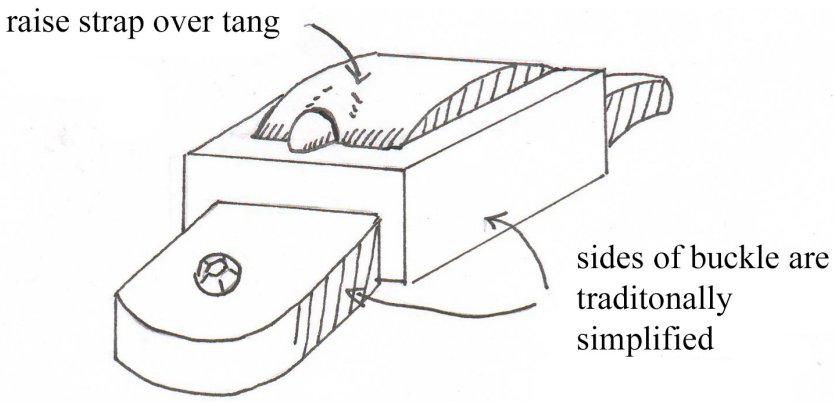
Begin petals by stabbing straight down near the outside edges of each one, beginning with the center. The tip of each petal has an outward roll that leaves the area thicker and less likely to break. Introduce a slight inward curve as you go down to make the petal cup-shaped.

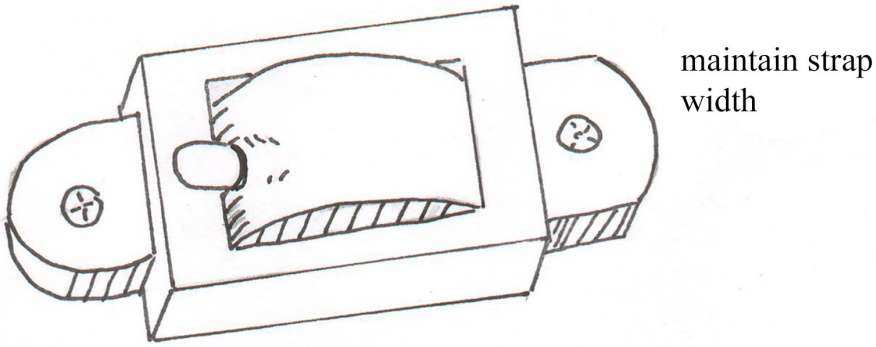
Dremel tools are tempting but it is awfully easy to cut dents into the petal faces. I prefer small gouges and tiny rifflers. Picture 46. I did use a small, round-headed Dremel bit to clean out the chips in the bottoms where my rifflers wouldn't reach. The roses will really come to life when you undercut the outermost petals and they no longer look like a block of wood.

Chapter 8, dia. 1

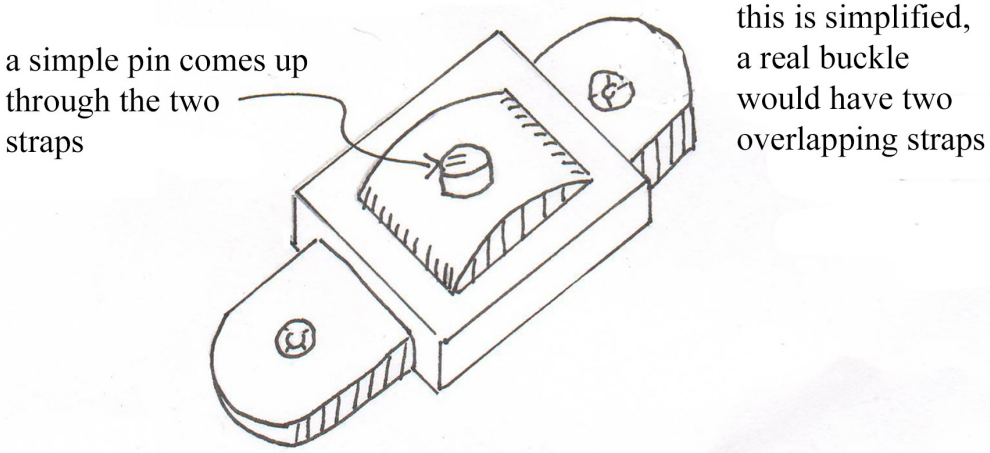
Two Types of Buckles

A Tang Buckle





Raised Pin Buckle



Chapter 8, picture 1

Laying out a girth strap.

Remember not to cut to the finished line until most of the wood has been cut away. Finish one edge completely, then draw a line for the other side.

Chapter 8, picture 2

The flat of a carpenter's chisel is used with a pull stroke. The tool is angled to make a slicing action. One hand resting on the figure controls depth of cut. (Jewelry is always removed before sanding).

Chapter 8, picture 3

Laying out blanket folds.

Shade the troughs in pencil (already cut out here) and make “X’s” along the ridges. The entire blanket is shaped before cutting down to make a raised border.

Chapter 8, picture 4

Blanket folds roughed out.

Now it’s time for rasps.

Chapter 8, picture 5

Using rifflers on blanket folds.

Rasps are used parallel to the ridges and grooves to keep them straight.

Chapter 8, picture 6

Folds nearly ready for sanding on Rose.

Strong side-lighting shows this needs a little more rasping. The shoulder area will be done next. Part of the blanket will then be cut down to make the raised boarder.

Chapter 8, picture 7

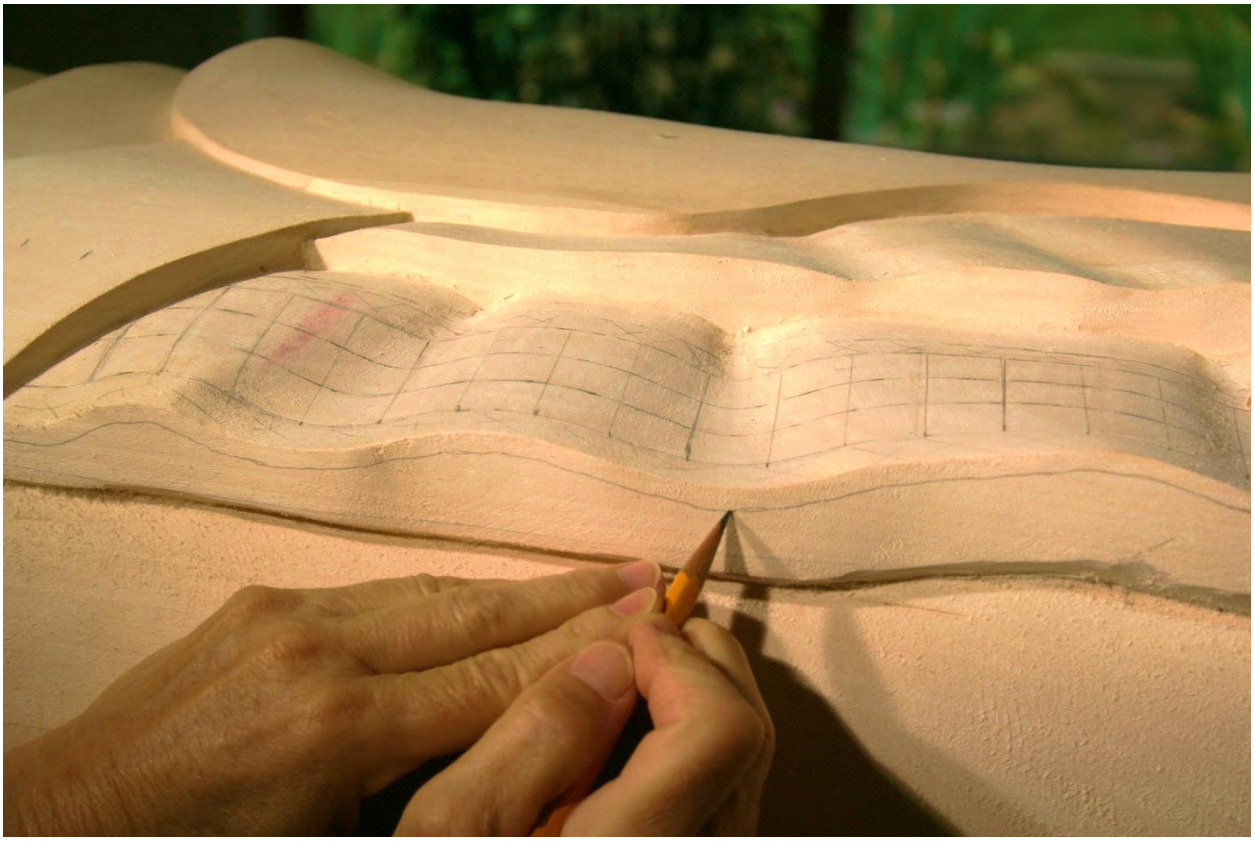
Finished blanket folds.

I have sanded the surface before laying out the raised boarder. This allowed me to assess the correctness of the folds better with side lighting. The cap is still dry fit.

Chapter 8, picture 8

Laying out a boarder edge.

This raised boarder has two levels, a higher center and not so high edges. To lower the bottom edge evenly I marked the depth in pencil first. The upper edge will be cut using the surface for reference. The blanket will be feathered down to it at a shallow angle. (I later changed the basket weave pattern marked here to simpler puckered fabric).



Chapter 8, picture 9

Cutting down the lower strip of the boarder.

I’m using a carpenter’s chisel straight down on a draw stroke. This cut will be repeatedly deepened. I made faint ‘X’s along the lower edge to remind me which surface gets cut down. Later the edges of the raised center will be rounded down to it.

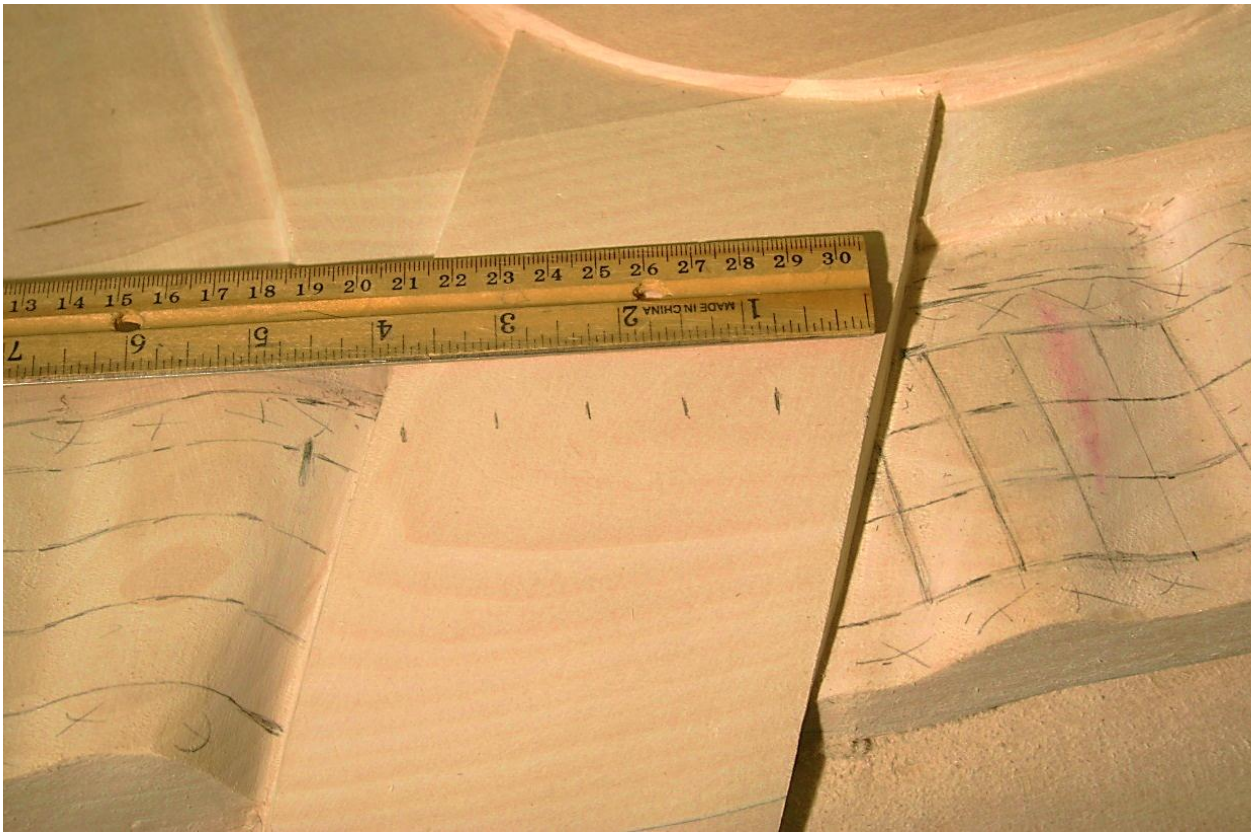
Chapter 8, picture 10

I’m freeing the central raised area. When I cut the upper edge of the boarder I will feather the blanket surface to it at a shallow angle rather than removing the entire blanket surface. The belly is to the right, the lower edge that had the ‘X’s has been cut out.

Chapter 8, picture 11

Maintaining a pattern.

Keep repeating patterns consistent under overlying elements. Temporary marks across the girth guided the grid layout as I worked to the left. I later opted for easier-to-carve puckers.



Chapter 8, picture 12

The tedious basket weave is gone. Now it is puckered fabric made from the raised central section. Puckers are a favorite of mine, fun and easy to make. Legs are still dry fit.

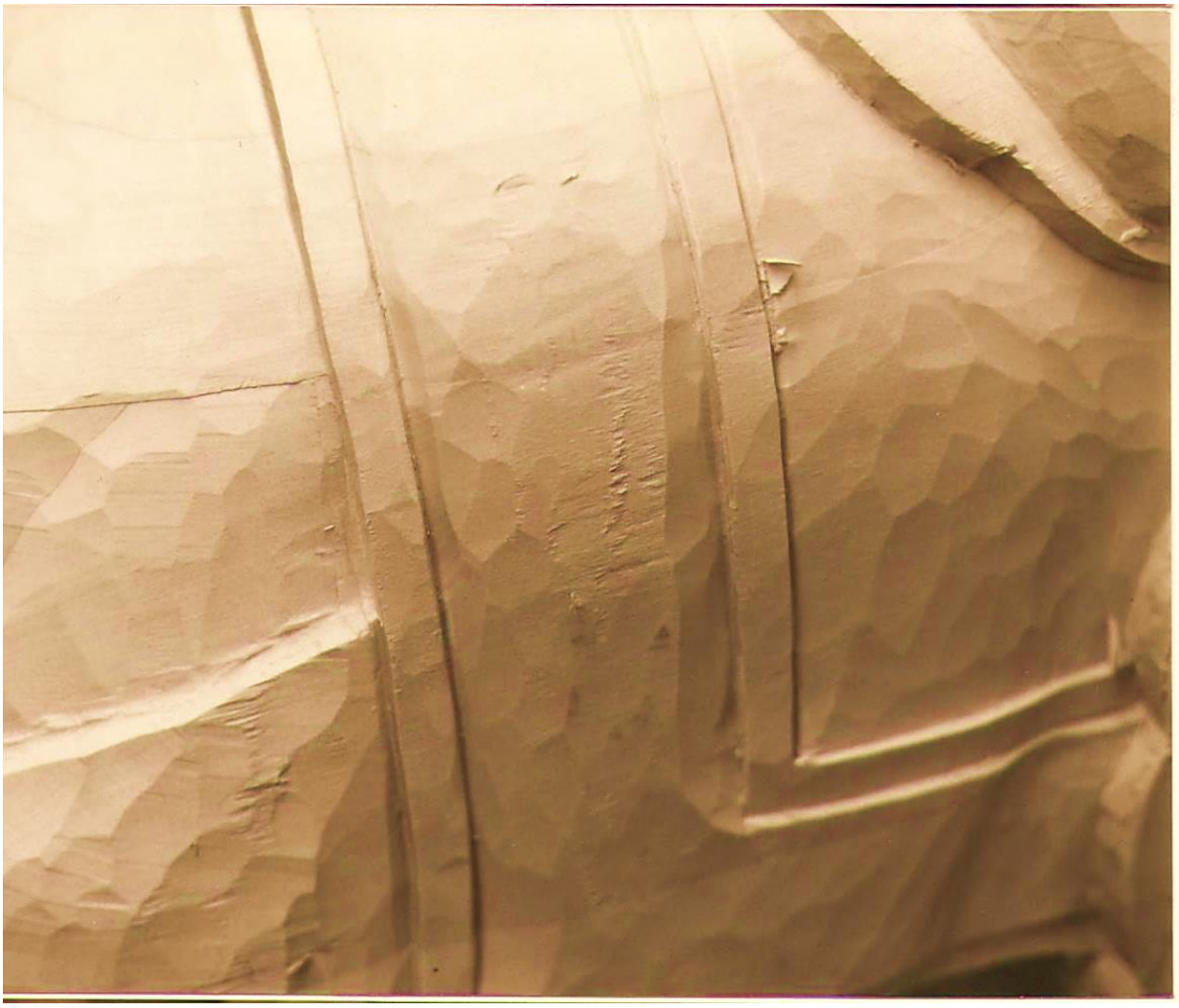
Chapter 8, picture 13

Finished puckered boarder on right side of Rose.

Chapter 8, picture 14a

Puckers on an earlier horse.

The entire center section is rounded down before puckers are laid in. The rounding has not been done along the bottom yet.



Chapter 8, picture 14b

Blanket puckers on an earlier horse.

Like the blanket I darkened areas that will be lowered. Folds are made shorter, tighter, and steeper near the edges. Carving was done before wood was laminated on abutting details.

Chapter 8, picture 15

Carving a buckle across the chest, initial roughing out.

Cutting right to the lines is done only after roughing out. That's why the right side is still large.

Chapter 8, picture 16

Carving the buckle, continued.

Folded sticky-back sandpaper is stiff enough to round the end of the strap. I usually avoid sandpaper until carving is completed. A fine rasp might have been a better choice here.

Note the “C” line on the neck and buckle.

Chapter 8, picture 17

Buckle edges.

A riffler is great for straightening edges and flattening the faces on three sides.

Chapter 8, picture 18

Using a chip carving knife.

Care must be taken to keep the buckle sides of equal width. There is no fudge factor here! I'm using a sturdy chip carving knife.

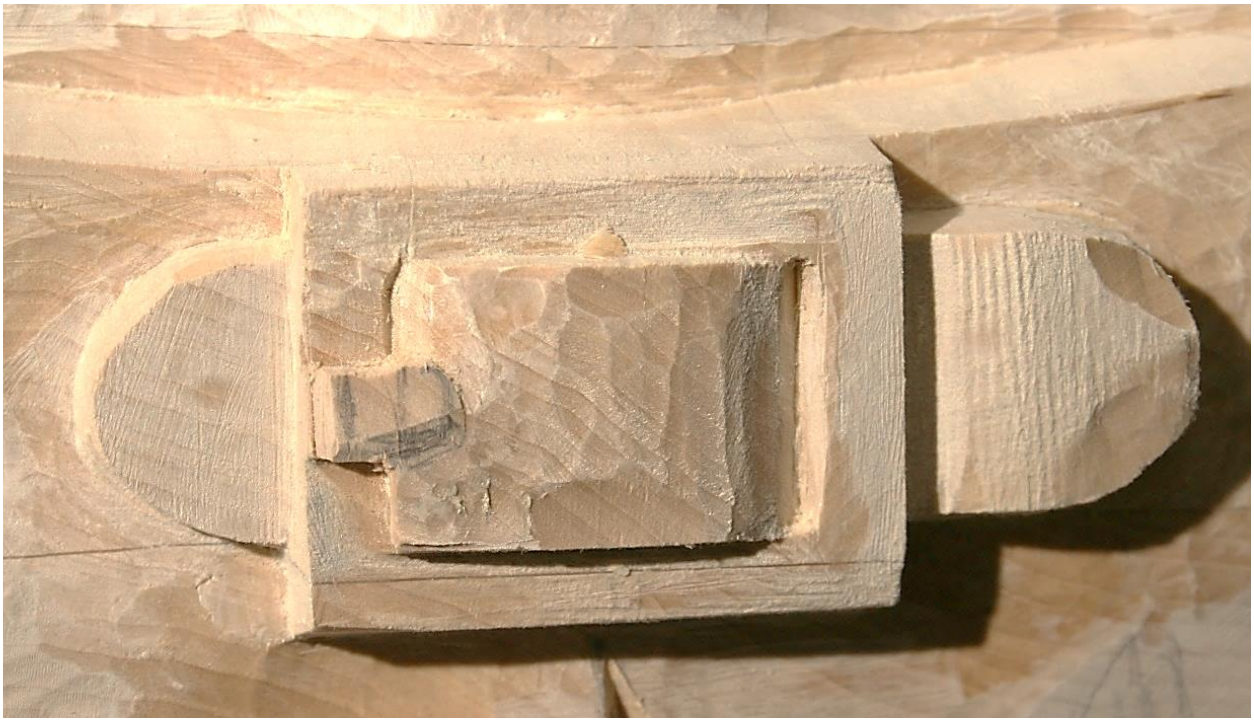
Chapter 8, picture 19

The buckle, continued.

The strap is left raised over the metal cross bar and tang. The tang will be lowered and shaped next.

Chapter 8, picture 20

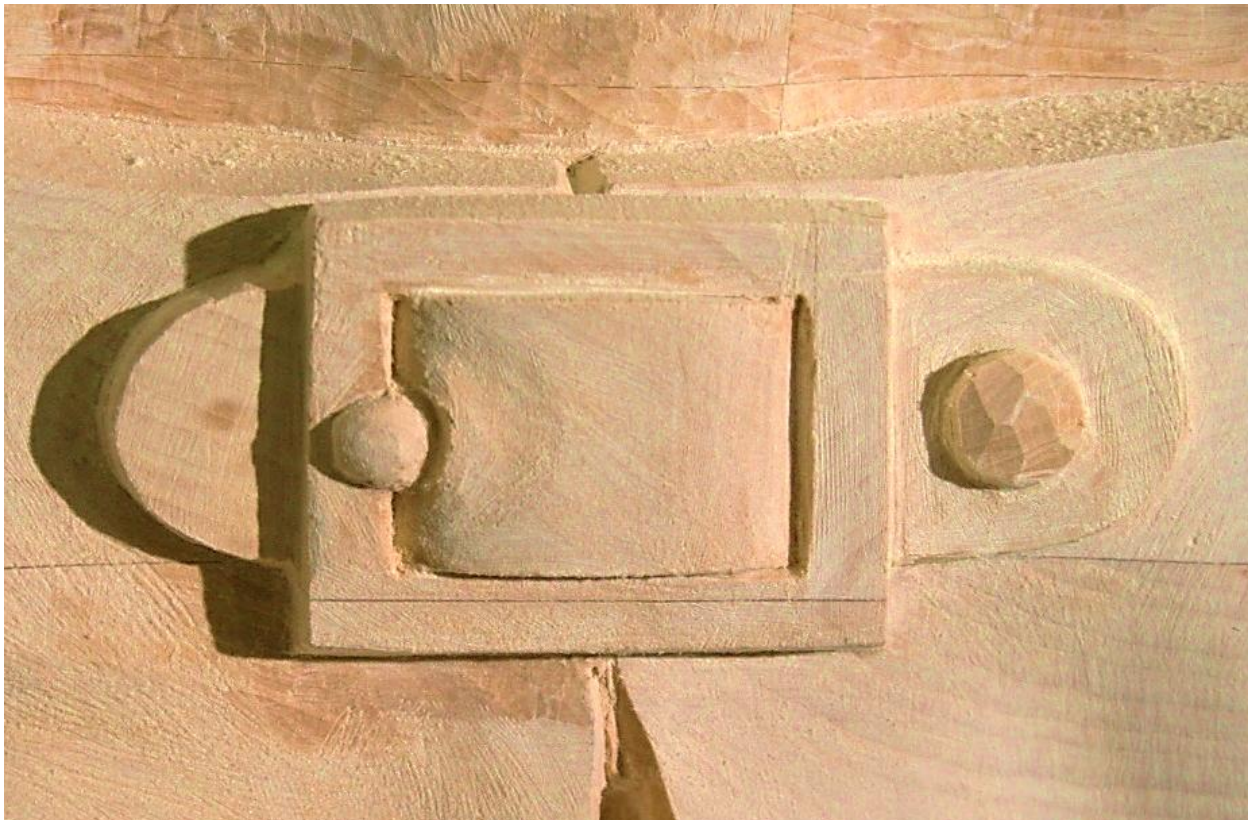
The buckle from another angle.



Chapter 8, picture 21

Buckle ready for primer.

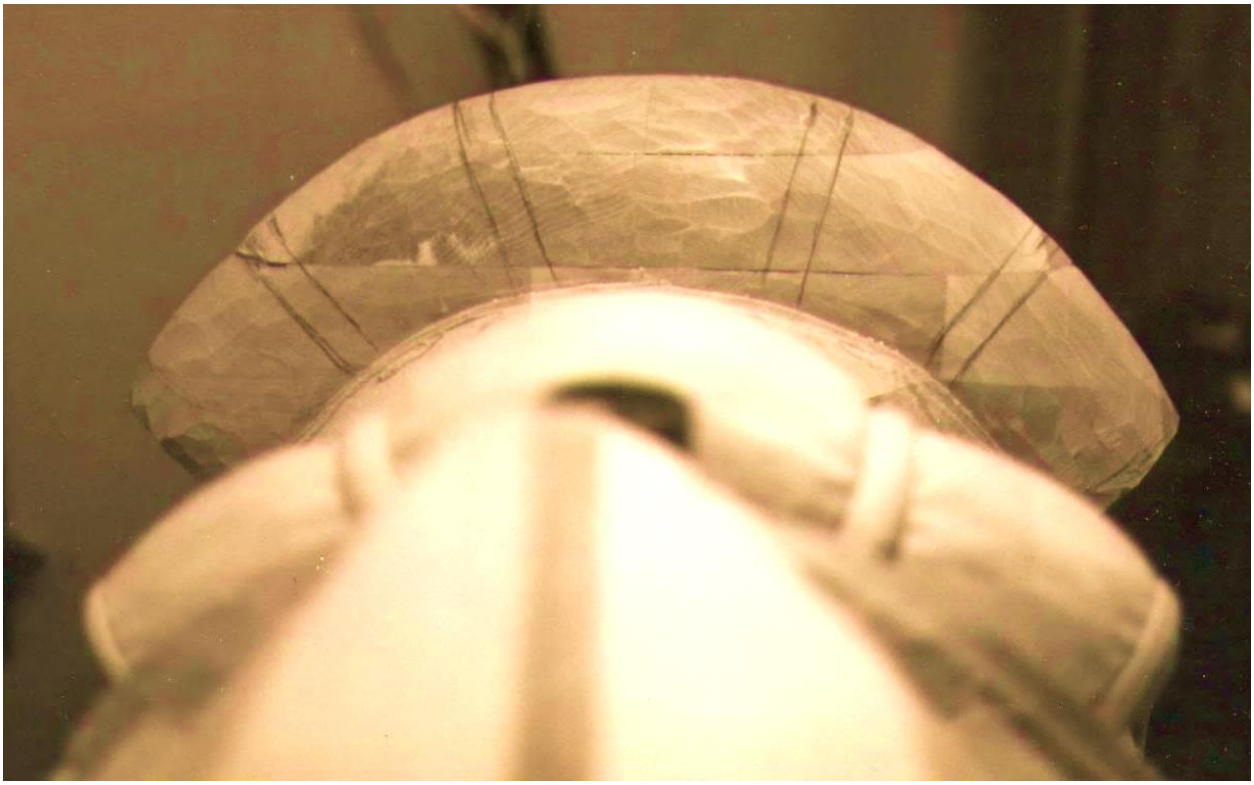
This is end grain which is always a bit fuzzy until primer or thinned shellac is applied. Then I'll sand to 100 grit. This buckle holds the front edges of the blanket together. A button was carved on the right side to 'anchor' the strap.



Chapter 8, picture 22

A bolster pillow on an earlier horse, frontal view (neck removed).

This will become the saddle cantle. The pillow is shaped before the rings are penciled on. A similar pillow on the front of the saddle has been completed.



Chapter 8, picture 23

Bolster pillow contined.

When downcutting you usually begin off the line. Because this would leave cuts in the pillow I worked right on the line. Using the flat side of a carpenter's chisel against the ring is the best way to prevent undercutting as carving proceeds.

Chapter 8, picture 24

Shaping rings on a bolster pillow.

I’m using the gouge upside down. The area between all the rings is rounded before any gathers are put in.

Chapter 8, picture 25

The finished bolster pillow from above.

Chapter 8, picture 26

Clay maquettes for the cherub.

To play with the basic body position I began on a Breyer horse. I then made a larger non-drying clay model (left) on a ‘carousel’ rump, which is narrower than a real horse.

Chapter 8, picture 27

Cherub maquette.

I’m finishing up the model. The wings and hair will be put on last.

Chapter 8, picture 28

Clay maquette from above.

The blanket roll, wings, and hair will be added now the body is done.

Chapter 8, picture 29

Cherub maquette with rough bolster.

The right wing was removed so I could better shape the shoulder. Extra clay was left for hair later. Notice the center line drawn through the clay.

Chapter 8, picture 29b

The cherub in wood, carved from wood in the cap. The right wing was left off to facilitate carving the torso. The face and arms were carved from wood laminated later.

Chapter 8, picture 29c

Another shot of the cherub in wood. For ease of access I did this with the cap piece sitting on my workbench.

Chapter 8, picture 30a

The cherub face in clay.

The cap is now glued to the torso. I created a clay model of the head and arms before laminating the wood on. It was anchored to a temporary common nail underneath. The clay was later set aside for reference. Once the head was shaped correctly I cut in the hair.

Chapter 8, picture 30b

Adding hair once the head shape was established. The arms holding a rosebud are still rough.

Chapter 8, picture 30c

The right wing was first made in clay right on the rounded torso. Note the registration marks from clay to wood.

Chapter 8, picture 30d

Preparing to laminate wood for cherub wing.

After tracing and removing the clay wing the surface in between was flattened. A scrap of dusted wood that just fit the area was used. Flattening required taking part of the cherub shoulder off. It was re-carved from the new wood.

Chapter 8, picture 30e

Adding wood for the right wing.

A piece of wood was made to fit the cutout. To avoid end grain carving I face glued this piece using yellow glue and two screws to clamp it.

Chapter 8, Pic. 30f

Using registration marks and the clay wing for reference the wood was carved. Recessed screws were left for strength. Holes and small gaps were later filled with Bondo.

Chapter 8, picture 31

Clay model for Hunter's tail.

This four inch clay model was held at arm's length with the full-sized paper template farther away for comparison. It was used for general reference later.

Chapter 8, picture 32

Beginning Hunter's tail.

The hole was cut at a downward angle. Grain direction in the bung must be oriented for maximum strength. To determine it I placed a scrap of wood (here much longer than needed) into the hole.

Here Hunter is just leaning against my custom made work stand so it is padded with heavy fabric.

Chapter 8, picture 33

Transferring the grain direction to the paper template.

The template from the full sized drawing is taped to the stick and grain direction drawn on the paper.

Chapter 8, picture 34

Fitting the bung.

The first piece requires a lot of handling so shaping the bung is done before the remaining pieces are glued onto the blank. A faint pencil marks the top line of the tail.

Chapter 8, picture 35

The tail bung.

The bung is shaped to fit the hole. Both bung and hole are slightly tapered. Chalk in the hole helped shape the bung although a perfect fit isn't necessary. Later the bung shoulders were fine-tuned to fit against the tail collar.

Chapter 8, picture 36

Roughing out the tail blank.

The blank has been built up. A Lancelot tool roughed out the basic shape using the clay model for reference. Notice the rump strap is not hollowed out between the legs.

Chapter 8, picture 37

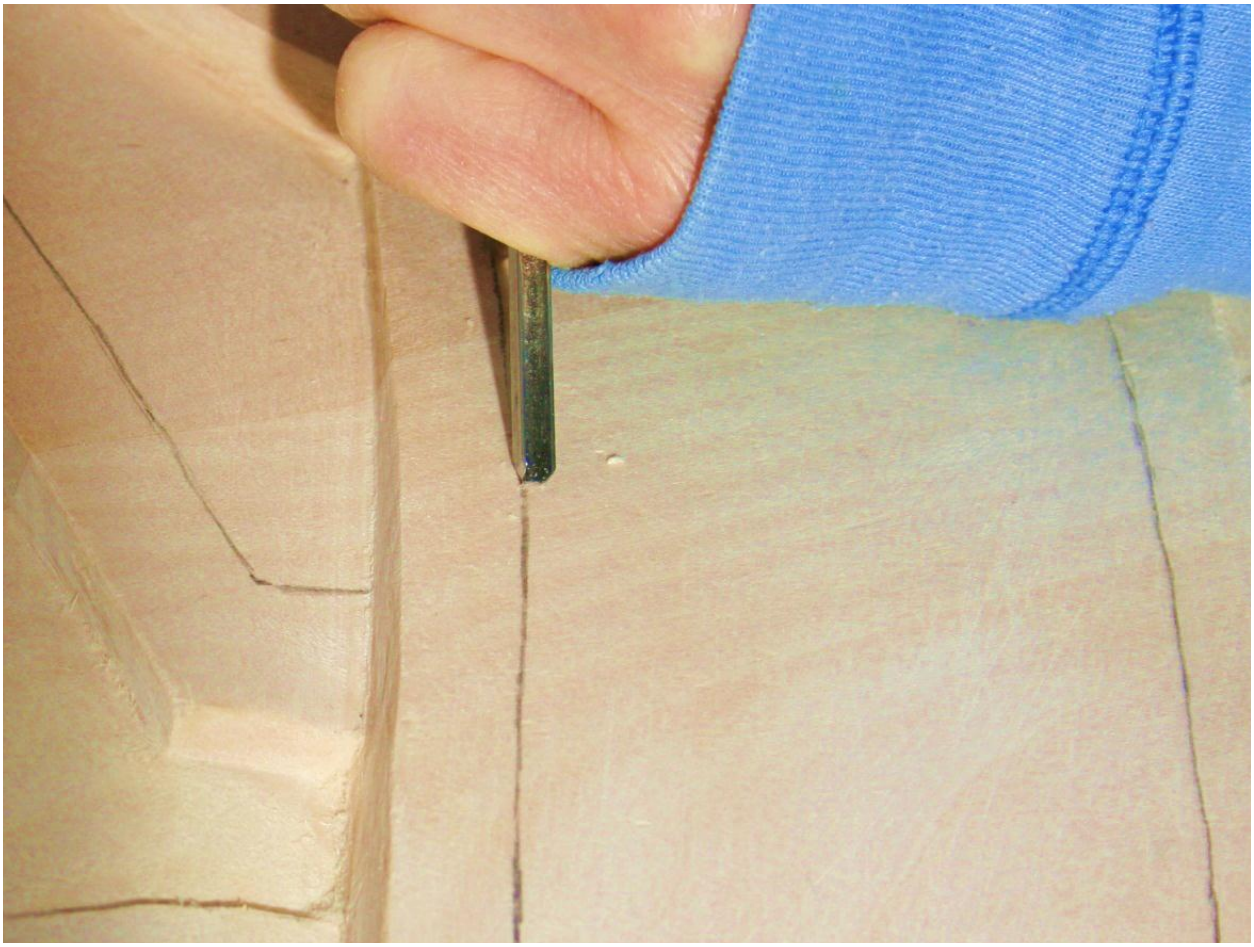
The tail is almost finished. The torso interface will be further fine-tuned.

Tails on working machines would not be this elaborate.

Chapter 8, picture 38

Piping with a veiner.

Veining is hard to carve evenly in one attempt so I do it in stages. A veiner narrower than the groove begins the cut inside the line. The groove is further shaped with a knife-blade rasp on straight lines and a tiny round-headed rasp on the curves.



Chapter 8, picture 39

Cutting piping with chisel.

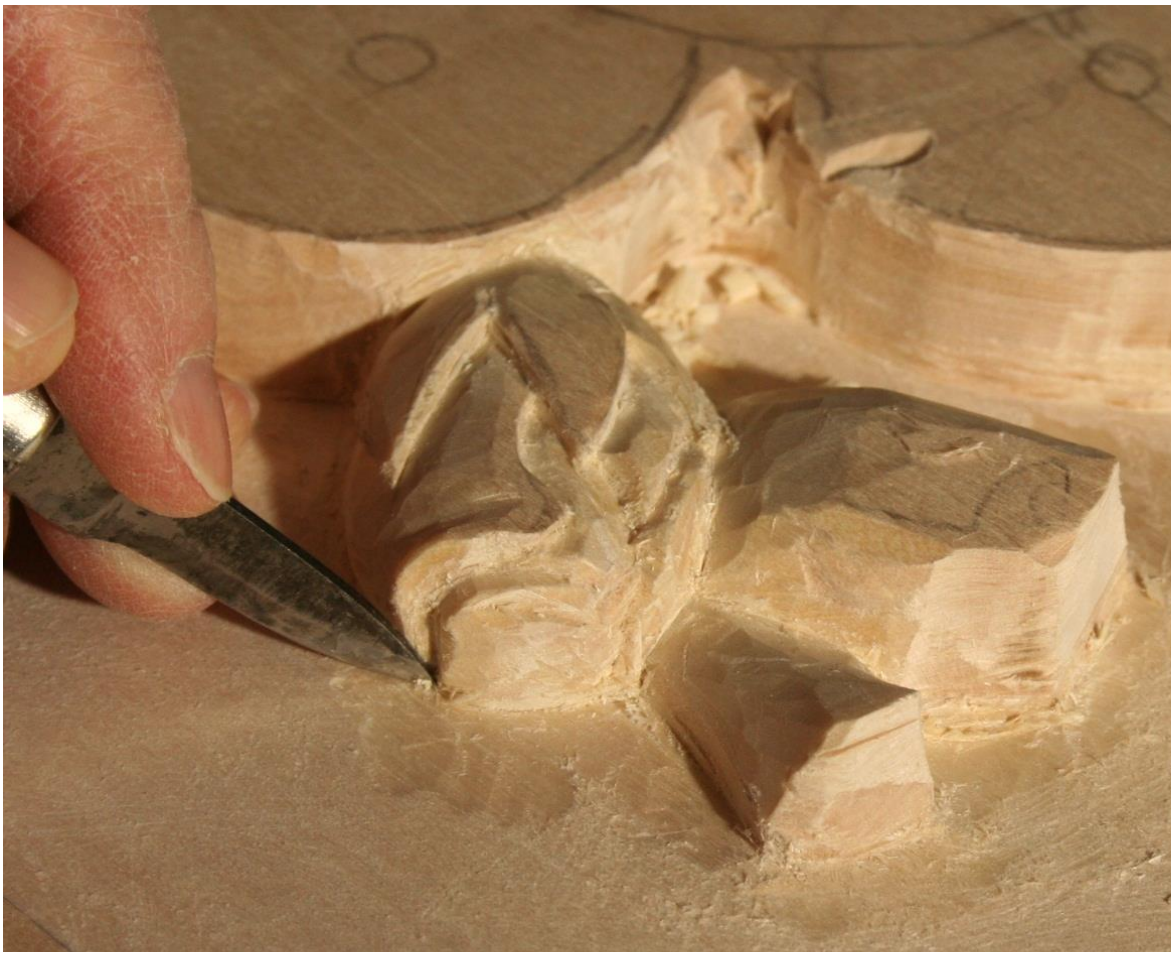
On straight sections a carpenter's chisel can be used to make a "V" inside the line. It is then deepened and the bottom rounded with a knife-blade riffler. Here the outside has been cut and I am making the inside half of the groove. A "V" piece of wood will pop out. Slice with the chisel and work on a draw stroke for control. It is easier to prevent tear out than using a veiner with this grain direction.

Chapter 8, picture 40

Roughing out rose buds with a chip knife. Wood for deeper relief roses was added later.

Chapter 8, Picture 41

Shaping rose buds. A chip carving knife is great for smaller cuts. Tiny rifflers clean up the edges.



Chapter 8, Picture 42

Rose buds are ready to be cleaned up with tiny rasps and sanding.

Chapter 8, Picture 43

Adding laminated wood for the roses. Clamps ran from a scrap stick on top to another stick screwed under the saw horse. The torso was firmly wedged in place first.

Chapter 8, Picture 44

All the rose crowns were roughed out with different angles and heights before any petals were begun. Note the lower relief flowers were finished before the laminations were added.

Chapter 8, picture 45

The layout of petals.

Concentric circles should be evenly spaced. Start from the center and be careful to leave enough wood for full petals on the outside row. Short lines show where the staggered petals will overlap. Notice the finished rose in the background.

Chapter 8, picture 46

The petals are begun, working from the center out. Red marks are the overlaps. Later the petals will be slightly undercut to create a cup shape. The tops will be rounded outward to make them look thinner but maintain strength. The rose in the background has been smoothed with fine rifflers. The finished roses can be seen on the painted horse.

CHAPTER 9

PAINTING

Most of my commissions were sent out in primer so I don't have a lot of experience painting. Go to tutorials for working on canvas for more comprehensive information. Here I will share a few tips particular to working with large carousel animals. On Rose I used artist tube oils over acrylic undercoats.

Setup for painting

Jumpers can be painted on a single sawhorse with a wide, sturdy top. A 3-foot pipe is run through the torso into a hole drilled in the sawhorse top and through a piece of plywood attached to the stretchers. Screw a scrap of wood underneath the plywood hole to keep the pipe from falling through. To provide some clearance place a 'washer' of ¾ inch plywood between the belly and sawhorse. This is helpful but the animal still has to be rolled on its side to completely paint the belly.

Some jumpers and all standers have legs that won't clear the stretchers on a single saw horse. Take two saw horses and place a long 10" X 2" or 12" X 2" board across them, leaving plenty of room to put the horse between them. Be sure you can tilt the horse on its side without hitting its feet. Extra space will give you room to paint. If a higher work surface is needed spacer blocks can be put under the board. Scrap blocks can go under stander feet to steady it. You may wish to make a deadman to help support a long board.

Drill a hole large enough for a pipe clamp through the middle of the board to hold the animal upright. If the board is long enough it can be lifted, horse and all, and shifted right or left to provide more space when painting or tilting.

For priming and painting animals I had two metal stands fabricated. One had a one-inch vertical pipe for standers, the other had a two-inch pipe with holes drilled through at regular intervals to hold up a jumper. The bases were longer in the direction that ran along the belly. Shorter side-to-side pieces lessened the tripping hazard. The base to pole was reinforced by metal struts. I always had to be careful not to turn the animal in the wrong direction or it became tippy. You can see part of one of the stands in chapter eight, picture 32.

I did not have my old stands when I painted Rose so I used just one of my heavy duty saw horses. I had to lower the stretchers so her feet cleared them.

Priming

Kilz primer is the easiest to sand. It is definitely not the same as BIN. Although Kilz comes in spray cans it will not penetrate deeply enough on the first coat so use a pint can and brush. Priming will raise the wood fibers, making the surface fuzzy. There is no way to get around re-sanding with 80-grit. To make sanding easier and to reach difficult places I do a lot of priming before assembling the figure. In addition to sand paper the surface can be smoothed with a sharp carving tool, sometimes used vertically as a scraper. On the rose petals I used a shallow chisel to actually carve the primer smooth.

The first sanding will leave traces of wood showing through the primer. You can use Kilz spray now, applying as many light coats as needed to make the surface solid white. Wear respiratory protection. Hard to reach areas may need to be done with a soft brush. Vacuum thoroughly between sandings.

There can be areas of overspray that end up rough. Find them by running your hand over the surface. (Note: I had one can of Kilz with a bad nozzle that left a lumpy texture. This is not typical and I threw it away). Finish with 80-grit sandpaper. You may need 100-grit to reach into tighter places. It must end up solid white.

Painting

Use strong side lighting to detect imperfections. Mark them with a bit of masking tape since pencil can be hard to sand off. Fill defects with spackle. (Bondo won't stick to primer.)

Choosing colors

Certain pigments are opaque and others semi-transparent. This is marked on the tubes and can change depending on brand. To avoid multiple coats select opaque colors. Since there are opaque primary colors it is possible to make any opaque color you wish. (Titanium white is opaque.)

Tip: If you use a natural tail buy it first and match the mane to it later.

The First Coat

A day before painting thoroughly vacuum your work area. This can kick up dust that could end up in the paint. Give the shop a day to settle out.

You can use acrylics for the whole project but they dry too quickly to blend in shading. Oils may need multiple coats to cover, which can take weeks to dry in between. To speed things up you can under-paint with acrylics first, using tube oils for the top coat.

Important note: *Artist oil paints can be applied over acrylics, but never the other way around.*

Apply acrylics in several thin coats to reduce brush marks. Once the first coat is on you can lightly spray the surface with a water mister between coats to help smooth them. (Don't bother spraying water directly on Kilz, it is too absorbent). Clean your brushes often so the paint doesn't harden up in the bristles.

Using pounce pads: If you use oil paints smooth brush marks with pounce pads. Make them by washing and machine drying cheese cloth twice. It can be purchased at a hardware store. This will remove most of the lint. Cut the cloth into pieces that can be wadded up to about the size of a golf ball. Make a few smaller ones too. Cover the ball with two layers of panty hose, wrapped tightly and closed like a bread bag. Moisten the pad slightly with a few drops of thinner on the cloth. Use the pad in a patting motion to smooth the paint. I find acrylics dry too quickly on the pad to be of any use.

Mix up plenty of the desired colors and store them in small, glass jars with straight sides. These are available in the paint section of craft stores. A few drops of waer or thinner added to the jar when storing will prevent skimming over.

I use only acrylic paint on the piping since mistakes can be easily wiped off or painted over. If you use oils in the piping the mistakes go everywhere. Finish all the piping in acrylics completely before starting on the oil coats. There is no reason to go over the piping with oil paint later. Varnish will even out differences in sheen.

Applying Oil Top Coats

I paint the trappings first. Having a dry figure to walk around makes life easier. Avoid transparent or semi-transparent pigments as these require multiple coats, even over acrylics that are close in color.

Gamblin's Galkyd Lite ***glazing medium*** will thin paint, reduce brush strokes and speed drying. (Liquin is another brand but I have never tried it.) Whichever you use stick to that brand throughout the project. The amount of Galkyd Lite can be from a few drops to 30 %. Use only as much as needed to get the paint to come off the brush well. The more you use the faster it will dry but the more transparent the paint will be. Adding too much may cause it to yellow or wrinkle later.

Solvents made for tube oils can be used to thin paint. Do not use mineral spirits from the hardware store for anything but cleaning brushes. Artist's turpentine, even the odorless kind, has a reputation for being unhealthy. A better alternative is **Gamsol**. (Some pigments come out of the tube thicker than others). The disadvantage is that it dries quickly and leaves the pigment with less binder. Adding too much makes the paint brittle and prone to cracking. I prefer a glazing medium for thinning.

The rule of painting "fat over lean" means that as you add coats there should be more paint and less additives. The oil base in the tube is more flexible. Putting more glazing medium in upper coats leaves a surface that is brittle and will eventually craze.

Over time alkyd glazing medium can gel up in the jar. It also makes a gooey mess on the container when poured out. I avoid both by using an eyedropper rather than pouring, and putting glass marbles into the jar to take up the air space at the end of each day. Keep it out of the sun and shake it before each use. Don't use old glazing medium that has been sitting in the shop for months. Purchase multiple eyedroppers since they eventually clog up.

Both Galkyd Lite and solvents like Gamsol will cause paint to dry very quickly on the pallet, often within 2 hours. It dries slower on the figure, some colors slower than others. Titanium White can take 4 days to touch-dry while others take just 24 hours. Start with paint on a corner of the pallet and add glazing medium to it in a separate area, just as you are ready to use it. Unused paint that has not had glazing medium added can be put back in the jar with a few drops of solvent.

Tip: Consider painting the more recessed elements of the trappings first. This gives you dry areas to steady your hand on.

To keep things simple I made Rose's body color Titanium White and added shading with Portland Gray Medium. It was a blessing not to have to recreate custom colors on the large body. Not having much experience I felt dapples would be too challenging. If you want them practice on a scrap. Dapples stay the same size over the horse, not smaller on the legs. Avoid making them perfectly round. A professional painter I spoke to uses a stipple brush to apply the dark dapple edges and then blends them with a fan brush while the base coat is still wet.

To create an antique look and enhance muscles shading can be blended into corners or depressions. Work in sections so you can apply the shading while the background paint is still wet. Make the shading on your pallet by mixing a touch of either black or a complementary color to the undercoat. **Make the color change very subtle.** The difference should barely show up on the palette. It will be more visible on the figure, especially when dry. Shading that is too dark will give the horse a dirty look. I apply shading with a soft brush and smooth it with a clean, soft filbert or fan brush.

As you add shading the undercoat will mix with it to varying degrees. Have an old T shirt moistened with odorless paint thinner in one hand to frequently clean your smoothing brush. (Rinsing the brush off in a jar will make it too wet. Paper towels produce lint). Keep standing back to evaluate your work. Shading will show up more at a distance. Since background color is always being picked up a little more shading is often needed in areas to even it out.

Try to use natural daylight. Glare from my shop lights is the biggest challenge I encounter. I bounce lights off the ceiling and floor but the sheen of wet oils is often a problem.

Note: Please do not paint the tongue or nostrils of your horse red! I don't know why I see this so often but it looks terrible. A nice flesh tone can be created by mixing Violet, Naples Yellow, and Titanium White.

On Rose I found it difficult to evenly shade the concave surfaces inside the nostrils and ears. By letting the shaded paint tack up a day on the figure I was able to lightly smooth the paint just using my fingertip. It worked surprisingly well.

Unfortunately my camera did not pick up Rose's shading well. If I hadn't shaded the intersections of the trappings, the blanket folds, and muscles, Rose would have looked very flat. Pictures 1 through 10 show her fully painted. Captions indicate which ones have been varnished.

Varnishing

Varnish is used to even out the sheen of different paint colors and protect the surface from dirt and rubbing. It is removable without affecting the paint underneath. The figure must be completely cured first. This can take six months if the paint is thick, though I know of painters who will varnish within 2 weeks. I suggest you go to the internet for more information on products and waiting time.

Very soft brushes made just for varnish reduce brush strokes. Even with a good brush the stroke will show if overlapped onto dried areas. This is not mentioned on canvass paintings since they are covered quickly. Work in sections where the overlaps won't show, such as intersections with the trappings. Varnish is thin and drips easily. Work from the top down so drips can be wiped off quickly with a lint free rag.

Gloss varnish can be applied in two thin coats. With satin varnish two coats gets tricky. The second coat can reactivate the first one, leaving an uneven sheen. The material that creates the satin finish also settles in the bottom of the can, making repeated stirring necessary and you want to avoid bubbles. Since I do little varnishing I kept Rose simple and stayed with gloss.

Varnish dries within a day so your horse can be mounted on a stand almost immediately.

Chapter 9, picture 1

Varnished Rose on Stand

Chapter 9, Picture 2

Cherub and roses.

The petals were highlighted with white while still wet. Trappings and muscles were slightly shaded. Keep the shading subtle to avoid giving the animal a dirty look. Rose had not yet been varnished here.

Chapter 9, Picture 3

Close up of cherub and roses. Gloss varnish has been applied now. This slightly darkens most colors.

Chapter 9, Picture 4

Cherub before varnish. The camera washed out all the shading

Chapter 9, Picture 5

Cherub. Notice the petal shapes on the roses.

Chapter 9, Picture 6

The color in mouth and ears did not photograph well in this picture of an unvarnished Rose. Notice how uneven the sheen is in colors before varnish is applied.

Chapter 9, Picture 7

Close up shoulder roses. Varnished now.

Chapter 9, Picture 8

The mane was matched to the tail, highlighted with a medium gray, then Titanium White.

Chapter 9, Picture 9

Another shot of Rose. I think she is winking at us!

Chapter 9, Picture 10

Left side of Rose. Ready for the race!

CHAPTER 10

THE DISPLAY STAND

Basic Construction

Bases are available online but I prefer to make a box of cabinet grade ¾ inch plywood with castors. This allows the figure to be moved and protects the feet of standers. Have sufficient width so it won't tip over, but of course not wider than your doorways! Avoid making it too short front to back or it will look pinchy. See picture one for Hunter's stand.

The top covers the skirt. The long sides cover the front and back pieces. Any voids are filled with Bondo before painting. Bondo will not stick to paint, use spackle to repair small defects found after priming.

Castors are screwed to blocks inside the corners. Lay the castors on a large scrap and rotate them to determine how big the blocks need to be for clearance to swivel 360-degrees.

Note: Later you will be using a long socket wrench and lag screws to attach the castors. Place the screws far enough in from the sides of the block to avoid splitting out if the stand is rolled over a bump.

The depth of the mounting blocks depends on the skirt and where the animal will be displayed. If it will be on carpet the castors sink in some. Have enough thickness in the blocks to prevent the skirt from dragging.

With standers the pipe flange is simply bolted with nuts and washers and covered with decorative brass. On jumpers I glue an additional piece of plywood underneath the deck to reinforce it. It is much easier to mount this piece ***before*** the skirts are on. A friction fit nail placed in a hole drilled through the deck at the pole and one in the center of the added piece helps position them. Long scraps provide pressure during glue up, the same procedure used on laminations. Diagram 1 shows a piece already glued and holes drilled for the bolts.

When gluing on sides place the top upside down. Raise it a few inches off the floor with scrap wood to provide space for the clamps. I glue on the end pieces first since they are short and more manageable. Make sure they are square to the top.

The side pieces get glued against them and hold them square. The long sides won't be perfectly straight. Have small nails ready to force out any inward bending and long clamps on the floor under the top to correct outward bowing.

Be careful at each step to clear away excess glue before it dries so it doesn't interfere with castor blocks and reinforcement strips later. Use Titebond Original, never waterproof ("exterior") glue.

Next mount the castor blocks inside the corners. Remember the two minute waiting rule when gluing. The edges to the sides keep the sides from being pulled off if they get hooked up on something. Ordinary wood screws can be recessed from the outside of the skirt ***into the blocks*** for reinforcement. Don't trust wood screws to hold in plywood end cuts.

1½" by 1½" reinforcement strips are run between the blocks to reinforce the top to the sides and ends. Pressure can be applied to the strips with scrap wood, carriage bolts, and long nuts as seen picture 2. Don't use too much force or the skirt may be forced off the top.

After drilling flange holes but before you bolt the flange in place, paint the base. Prime it with Kilz and finish with latex wall paint. An eggshell finish is easier to keep clean than flat, and a greyed down color shows less dust than black.

Mounting the Figure on the Base

Place the horse and the stand on their sides on the floor. Never tilt a figure using the legs as a fulcrum. Get helpers to lift it, holding on as close to the torso as possible so as not to stress the leg joints. Avoid picking it up by its head.

Align the pipe, now permanently mounted on the stand with bolts and washers, with the torso holes by raising the horse off the floor. (The stand will be wider than the figure). Sheets of rigid foam insulation and a soft blanket under the horse work well for this. Don't place the insulation sheets below the legs so you can shove the base upward while the animal is still on its side. Diagram 5 shows how to position a stander and base. (Because it is a stander there is no pin and washer in the illustration.) With jumpers don't forget to slide on the decorative flange, sleeve, **washer and pin** first.

Slide the base on and set the assemblage upright. When rotating try not to stress the skirts or castors. Get helpers to lift some of the weight. Be aware that as you rotate the animal the castors will be engaged and the whole assemblage may try to roller skate away from you. Have someone at the opposite side to keep it in place. All that is left is to slide the top brass on and put on the top knob.

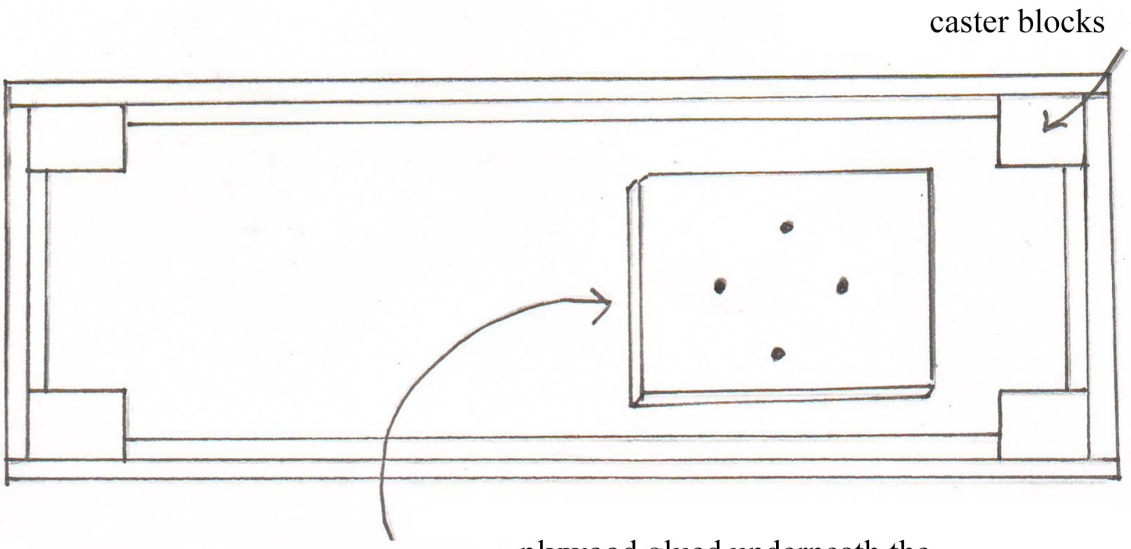
Note: When rolling the figure around be sure it stays aligned with the long axis of the base. If it gets crooked it becomes easy to tip.

Final Location

Pieces of wood move differently with humidity changes. Some seams won't stay perfectly smooth during seasonal changes. With modern glues they won't fail but a small break in the paint will occur there. There is no way to avoid it. Embrace the fact you are working in an organic medium. Minimize humidity and temperature changes by not placing your figure over a heat register or in a sunny window.

Chapter 10, dia. 1

Bottom View of Jumper Stand

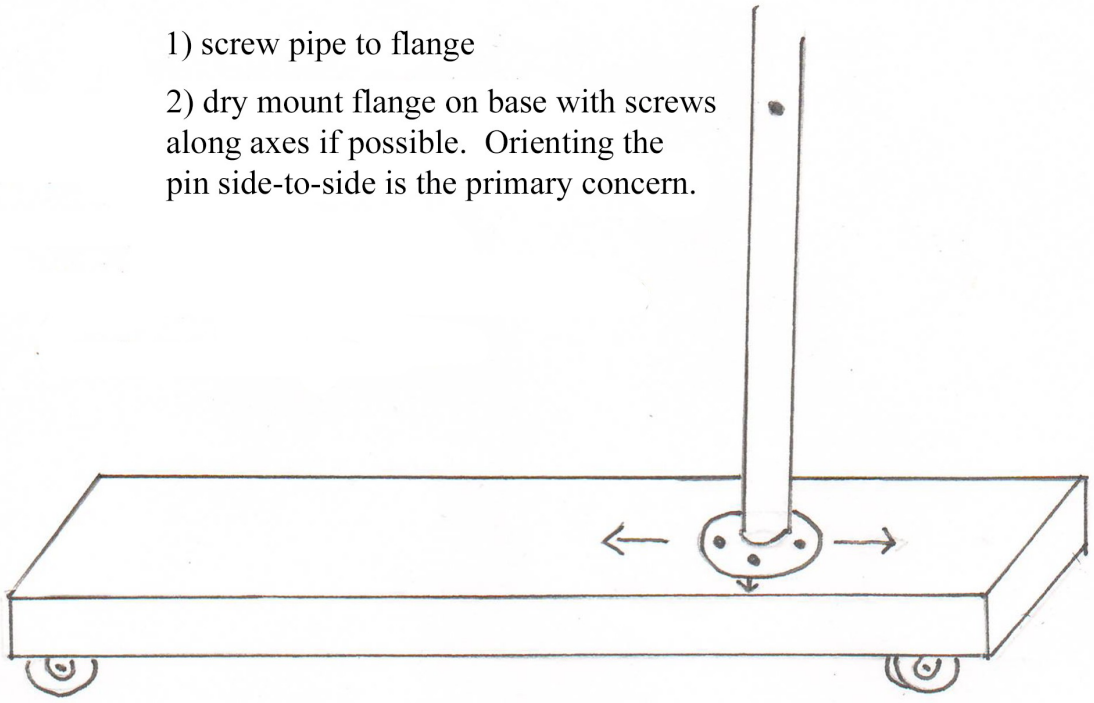


Chapter 10, dia. 3

Flange, Pipe, and Support Pin (Jumpers)

1) screw pipe to flange

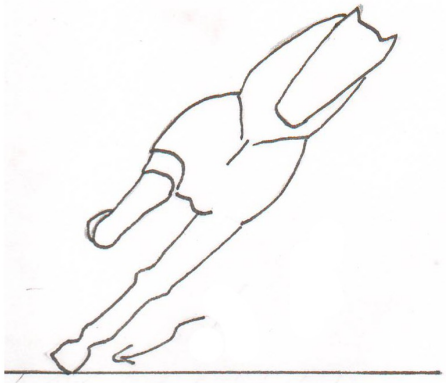
2) dry mount flange on base with screws along axes if possible. Orienting the pin side-to-side is the primary concern.



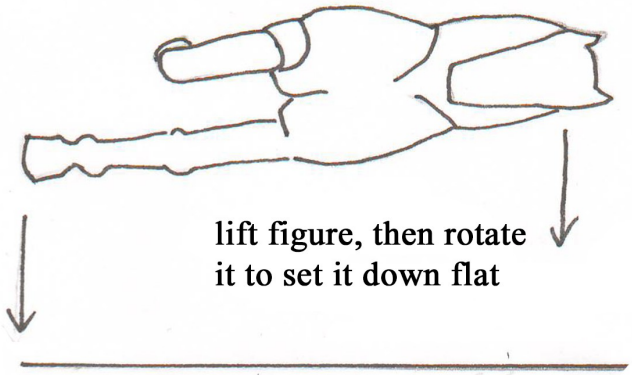
Chapter 10, dia. 5

Rotating Figures

X



don't rotate figure with
legs touching the floor,
they could snap

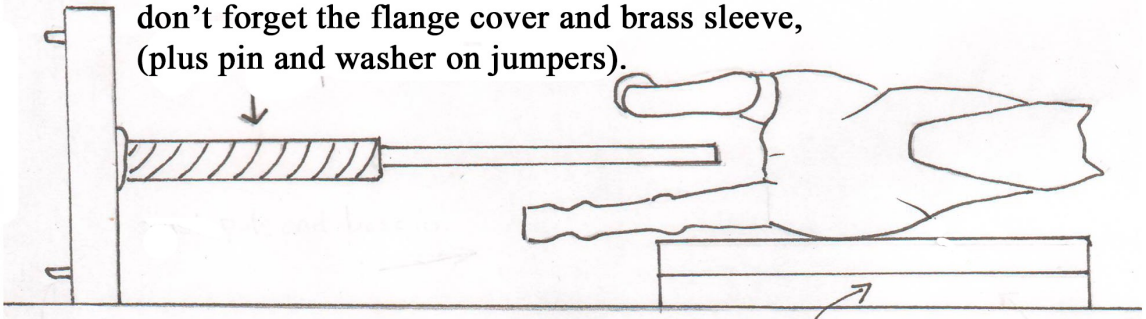


**lift figure, then rotate
it to set it down flat**

**lay base and horse flat, slide the animal on, and lift
the assembly slightly before setting upright**

be careful not to break castors when rotating

**don't forget the flange cover and brass sleeve,
(plus pin and washer on jumpers).**



**sheets of rigid foam insulation help
hold the animal at the correct height**

Chapter 10, picture 1

This shows the length of the base on Hunter.

Chapter 10, picture 2

The underside of a stander base.

Carriage bolts and long nuts with scrap wood apply pressure when gluing in reinforcement strips. Two wrenches open the nut and bolt. The rounded head of the bolt makes it possible to roll it out of place once the length is established during a dry fit. Get all the bolts correct so they can be pushed into place quickly once the glue is applied. Don't use too much pressure. Don't forget downward pressure. Waxed paper keeps the scrap blocks from sticking. Notice the blocks in the corners for the castors.

Chapter 10, picture 3

The lower brass on a jumper.

A “U” channel is cut into the brass, which must be *fully seated* on the plumbing flange before marking. The top of the sleeve is below the top of the pin so it doesn’t bear any weight. A large washer spreads out pressure on the torso. (The 5 inch straight section of the pin is half hidden in this photo. It extends well past the other side of the pole.)